TRANSMISSION CORPORATION OF ANDHRA PRADESH LTD.

From:
Executive Director/HRD & Planning.
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To
The Secretary,
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Lr.No.ED/HRD&Plg/SE/Plg/DE/Plg&RAC/ADE/RAC/APERC/D.No.89 /2017, dt.08 .08.2017

Sir,

Sub:- APTRANSCO – Revised Resource Plan for balance 3rd control period (FY 2016-17 to FY 2018-19) and 4th control period (FY 2019-20 to FY 2023-24) – Submission - Reg.

Ref:- 1. Lr. No.APERC/JD(PPP)/F.No. / D.No. /2016, dt. 05.10.2016.
2. Lr. No.APERC/JD(PPP)/F.No. 301A/ dt. 01.12.2016.
3. Lr.No.ED/HRD&Plg/SE/Plg/DE/Plg&RAC/ADE/RAC/APERC/D.No. 10/2017, Dt. 16.01.2017
4. Record of Proceedings dt. 01.07.2017 by APERC.

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With reference to the letters cited at reference (1) and (2), and in pursuant to the MYT Regulation (Regulation 05 of 2005) issued by the Hon'ble APERC, the revised Resource Plan for balance period of 3rd control period i.e., FY 2016-17 to FY 2018-19 and 4th control period i.e., FY 2019-20 to FY 2023-24 in respect of APTRANSCO (STU) was submitted before Hon'ble APERC vide reference (3) cited.

It is to submit that, Hon'ble APERC in the hearing dt. 01.07.2017 vide reference (4) cited commented that, *"Sri K.Gopal Choudary, learned counsel, who is requested by the commission to assist the commission in the matter pointed out that the projections made in the different plans submitted by the distribution companies and the transmission corporation are not complementary to each other and are presenting many areas of divergence. Sri P.Shiva Rao, learned Standing Counsel is requested to have a comprehensive relook by the utilities into the entire issue and report to the Commission by the next date of hearing"*.

Accordingly, APTRANSCO has revised the Resource Plan for balance period of 3rd control period i.e., FY 2016-17 to FY 2018-19 and 4th control period i.e., FY 2019-20 to FY 2023-24 by removing the divergences among the plans submitted by APTRANSCO/APDISCOMs.

In view of the above, I am directed to submit the revised Resource Plan to Hon'ble APERC for Approval.

Encl: 4 sets of Revised Resource Plan

Yours faithfully,

Executive Director/HRD & Planning (FAC)

Resource Plan

(FY2017-FY2024)

JULY 2017

Resource Plan for balance 3rd and 4th Control Period (FY 16-17 to FY 23-24)

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Chapter 1

AP State Load forecast & Power procurement Plan for the balance 3rd Control Period (FY 2017-18 to FY 2018-19) and 4th Control Period (FY 2019-20 to FY 2023-24)

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1 State Load forecast and Resource plan of Andhra Pradesh

1.1 Introduction

The Andhra Pradesh Electricity Regulatory Commission (APERC), Regulation 5 of 2005 directs APTRANSCO to collect and consolidate sales forecast and power procurement from distribution licensees and to file Resource Plan for Hon'ble Commission's approval. The Resource Plan shall contain the following

- Consolidated Sales & Load Forecast
- Consolidated Power Procurement Plan
- Capital investment & Transmission plan of APTransco

The Hon'ble Commission shall approve the Resource Plan as per the Guidelines on Load Forecast, Transmission Plan and Power Procurement Plan and the APTRANSCO and Distribution Licensees shall adopt them in the Multi-Year and Annual filings (MYT) for the respective Control period.

The Guidelines for Load Forecast, Resource Plan and Power Procurement state that the licensee shall submit a Resource Plan for a period of two control periods i.e. Load Forecast, Power Procurement from the year of commencement beginning from 1st April and ending on the following 31st March including a detailed plan for the Control Period under consideration for tariff review purpose and an indicative plan for the subsequent control period.

The third control period starts from 01 Apr 2014 and ends on 31 March 2019 while the fourth control period starts from 01 Apr 2019 and ends on 31 March 2024.

Post bifurcation of Andhra Pradesh in to Telangana and Andhra, The APTRANSCO submitted detailed Resource Plan for the 3rd and 4th control periods in January 2015 for the review and approval of the Hon'ble Commission.

As per the directions of the Hon'ble Commission, APTRANSCO submitted Resource Plan for balance 3rd control period (FY 2016-17 to FY 2018-19) and 4th control periods (FY 2019-20 to FY 2023-24) in December 2016 for the review and approval.

As per the Hon'ble APERC directive, APTransco is herewith submitting detailed Resource plan for balance 3rd Control period (FY 2017-18 to FY 2018-19) and 4th Control Period (FY 2019-20 to FY 2023-24).

The Resource Plan as submitted by APTransco based on the Discoms and Genco perspective plan consists of the following sections

- Consolidated Sales Forecast
- Loss Trajectory
- Consolidated Load Forecast
- Consolidated Power Procurement Plan
- Capital Investment Plan (Transmission plan) of APTransco

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, NVVNL 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 16,553 MW as per power allocation after state bifurcation as on 30-06-2017. The total number of consumers in the state is 171.82 lakhs which includes 138.85 lakhs of domestic, 12.54 lakhs of commercial, 1.44 lakhs of industrial, 16.57 lakhs of agricultural categories as on 31.3.2017. The per capita consumption of Andhra Pradesh as on 31st March 2016 was 987 units.

The total energy consumption (at utility periphery) in Andhra Pradesh during FY 2016-17 was 54,848 MU. The peak demand reached 7,965 MW.

Present position of Generation, Transmission & Distribution

The present installed capacity in the state is 16,553 MW , comprising 4,410 MW of APGenco thermal, 1,721 MW of APGenco hydel, 251 MW of APGPCL & APDiscom Gas, 2,089 MW of CGS Share, 2,415 MW of IPP's & others and 5,666 MW of NCE's.

The present transmission infrastructure consists of 10 Nos. of 400 kV substations, 87 Nos. of 220 kV substations, 190 Nos. of 132 kV substations and 22,030 Ckm of EHT lines as on 31.03.2017. The transmission losses during FY 2016-17 was 2.92%.

There are 2766 Nos. of 33/11 kV substations and 24,803 ckm of 33 KV lines as on 31.03.2017

1.4 Present Power Supply Position:

Power is being supplied to Domestic, Commercial & Industrial consumers along with Agricultural consumers in rural areas through mixed feeders. There are 706 Nos. of dedicated/express industrial feeders. 7 hours three phase power supply is being given to agricultural consumers mostly in single/two spells and supply timings are rotated every 7 days.

Three phase supply to rural areas for Domestic, Commercial & Industrial consumers is along with 7 hrs Agricultural supply only. Whereas, balance 17 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.

Agricultural feeders have been separated from Domestic feeders in 14 mandals on a pilot basis during 2011. In these mandals, 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.

Since 2014, 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.

1.5 Consolidated Sales and Load forecast

The consolidated Sales and Load forecast is prepared using trend method, in view of demand expected to come up due to new capital city, PCPIR (Petroleum, Chemicals and Petrochemical Investment Region) corridor, Vizag Chennai Industrial Corridor (VCIC), Sri City SEZ , new airports, new sea ports. Special package to Andhra Pradesh state would further stimulate the Industrial sales.

New lift irrigation schemes i.e Purushottampatnam ,Krishnavaram under Polavaram LI scheme, Chintalapudi, Kondaveeti Vaagu etc will further contribute in increasing demand.

Transmission losses will be reduced from present (FY2016-17) level of 2.92 % to 2.87% by FY2018-19 and will further come down to 2.74% by FY 2023-2024.

T & D losses will follow similar trend from 11.25% in FY 2016-17 to 11.10% by FY2018-19 and further come down 10.02% by FY2023-24 due to efficiency gains and measures like HVDS (High voltage distribution system) undertaken by AP Discoms. APDiscoms have started replacing agricultural pumpsets with energy efficient

agricultural solar pumpsets. The table below shows the agricultural demand being met through solar pumpsets.

Particulars	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
Number of Solar Pumpsets	18,500	23,500	28,500	33,500	38,500	43,500	48,500
Agricultural Demand met through Solar Pumpsets* (MU)	111	141	171	201	231	261	291

The detailed forecast furnished by the APDiscoms in the revised Resource plan submitted to Hon'ble APERC in July 2017 is consolidated and depicted in the below table.

LT Category	FY 2016-17	FY 2017-18	FY 2018-19
LT-I Domestic	12,206	13,599	15,154
LT-II Non-domestic/Commercial	2,554	2,827	3,131
LT-III Industrial	2,577	2,836	3,127
LT-IV Cottage Industries	42	44	47
LT-V Agriculture	11,668	12,085	12,518
LT-VI Street Lighting & PWS	853	830	808
LT-VII General Purpose	150	160	171
LT-VIII Temporary Supply	1	3	3
LT Total (Restricted)	**30,052**	**32,384**	**34,958**
LT Total (Unrestricted)	**30,070**	**32,384**	**34,958**
HT Category			
HT-I Industry	10,452	11,385	12,417
HT-I (B) Ferro-Alloys	1,718	1,871	2,038
HT-II Others (Commercial)	1,270	1,376	1,493
HT-III Public Infrastructure and Tourism	90	97	104
HT - IV Agriculture	1,273	1,720	1,794
HT-V Railway Traction	1,284	1,331	1,381
HT-VI Townships and Residential Colonies	67	70	73
HT-VII Green Power	0	0	0
HT-VII RESCOs	703	744	800
HT-VIII Temporary Supply	3	3	3
HT Total (Restricted)	**16,861**	**18,598**	**20,103**
HT Total (Unrestricted)	**16,861**	**18,598**	**20,103**
LT+HT Total (Restricted)	**46,912**	**50,983**	**55,062**
LT+HT Total (Unrestricted)	**46,931**	**50,983**	**55,062**

LT Category	FY 2016-17	FY 2017-18	FY 2018-19
T& D losses -MU	**5,949**	**6,507**	**6,876**
T& D losses -in %	11.25%	11.32%	11.10%
Energy Requirement - MU	**52,880**	**57,490**	**61,938**
T losses in %	2.92%	2.90%	2.87%
Energy Requirement - MU	**54,848**	**57,490**	**61,938**
Annual Load Factor - %	78.61%	76.00%	76.00%
Peak Load - MW	**7,965**	**8,635**	**9,303**

Forecast from FY2019-20 to FY 2023-24

The load forecast from FY2019-20 to FY2023-24 is as under.

LT Category	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
LT-I Domestic	16,891	18,829	20,995	23,415	26,120
LT-II Non-domestic/Commercial	3,469	3,845	4,263	4,729	5,248
LT-III Industrial	3,454	3,821	4,233	4,698	5,220
LT-IV Cottage Industries	50	53	56	59	63
LT-V Agriculture	12,967	13,432	13,915	14,417	14,937
LT-VI Street Lighting & PWS	786	765	745	725	705
LT-VII General Purpose	184	196	210	225	242
LT-VIII Temporary Supply	3	3	3	3	3
LT Total (Restricted)	**37,801**	**40,944**	**44,420**	**48,270**	**52,538**
LT Total (Unrestricted)	**37,801**	**40,944**	**44,420**	**48,270**	**52,538**
HT Category					
HT-I Industry	13,559	14,823	16,225	17,780	19,506
HT-I (B) Ferro-Alloys	2,222	2,423	2,645	2,890	3,159
HT-II Others (Commercial)	1,621	1,762	1,918	2,090	2,278
HT-III Public Infrastructure and Tourism	112	121	131	142	156
HT - IV Agriculture	1,804	1,847	1,857	1,867	1,877
HT-V Railway Traction	1,432	1,486	1,542	1,601	1,662
HT-VI Townships and Residential Colonies	77	81	85	90	93
HT-VII Green Power	0	0	0	0	0
HT-VII RESCOs	873	964	1,077	1,215	1,381
HT-VIII Temporary Supply	3	3	3	3	3
HT Total (Restricted)	**21,702**	**23,511**	**25,483**	**27,676**	**30,117**

LT Category	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
HT Total (Unrestricted)	**21,702**	**23,511**	**25,483**	**27,676**	**30,117**
LT+HT Total (Restricted)	**59,503**	**64,454**	**69,904**	**75,947**	**82,654**
LT+HT Total (Unrestricted)	**59,503**	**64,454**	**69,904**	**75,947**	**82,654**
T& D losses -MU	**7,315**	**7,746**	**8,125**	**8,637**	**9,200**
T& D losses -in %	10.95%	10.73%	10.41%	10.21%	10.02%
Energy Requirement - MU	**66,818**	**72,200**	**78,029**	**84,584**	**91,854**
T losses in %	2.85%	2.83%	2.80%	2.77%	2.74%
Energy Requirement - MU	**66,818**	**72,200**	**78,029**	**84,584**	**91,854**
Annual Load Factor - %	75.00%	75.00%	75.00%	75.00%	75.00%
Peak Load - MW	**10,170**	**10,989**	**11,877**	**12,874**	**13,981**

1.6 Comparison of Load forecasts

Comparison of Energy (MU) forecast and Demand Forecast (MW) by Discoms with the 19th EPS projections by CEA are shown below in table and figure 1 and figure 2. The slightly higher growth expected in Discoms load forecast (APTransco) compared to 19th EPS report by CEA is due to higher industrial sales growth estimates and also due to 9hrs supply to Agriculture.

Energy Requirement (MU)	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	CAGR 2017-24
19th EPS report by CEA	54673	58846	63290	68034	73090	78540	84429	90794	7.5%
Resource plan	55160	57490	61938	66818	72200	78029	84584	91854	7.6%

Peak Demand (MW)	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	CAGR 2017-24
19th EPS report by CEA	8245	8874	9544	10259	11021	11843	12731	13690	7.5%
Resource plan	7965	8635	9303	10170	10989	11877	12874	13981	8.4%

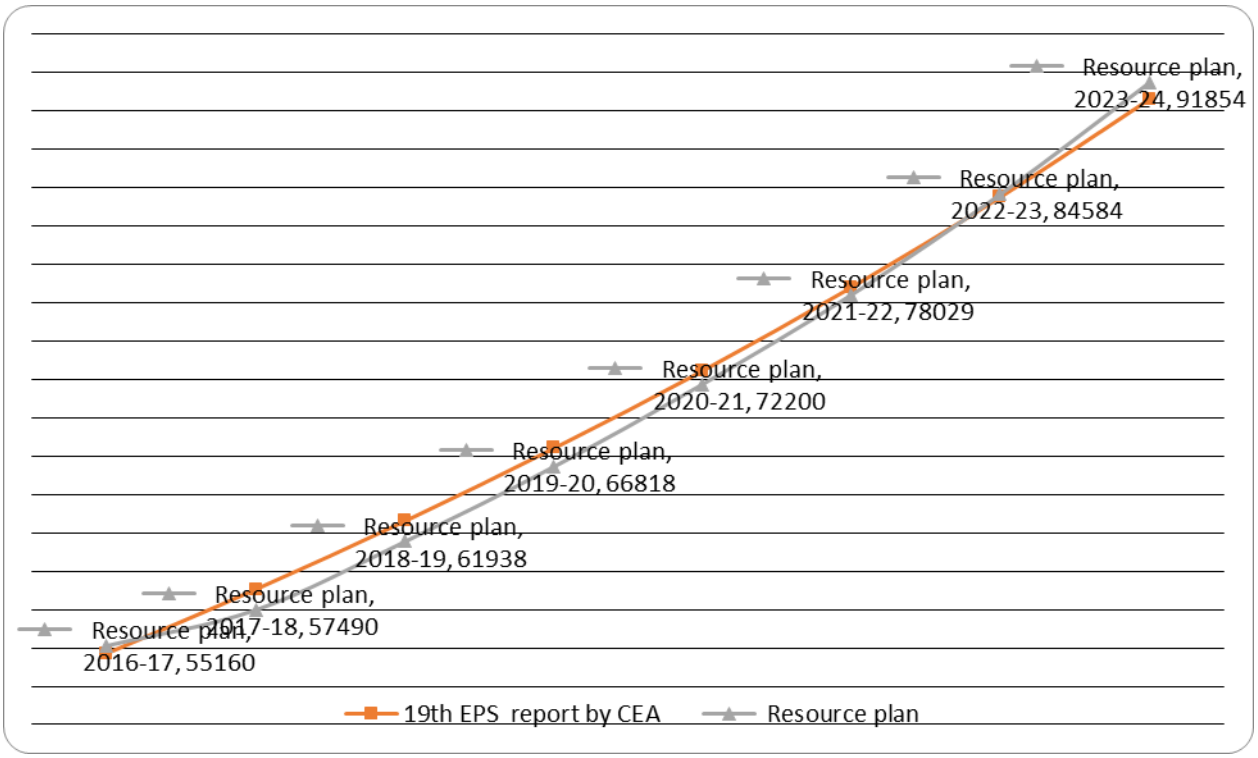

Figure 1

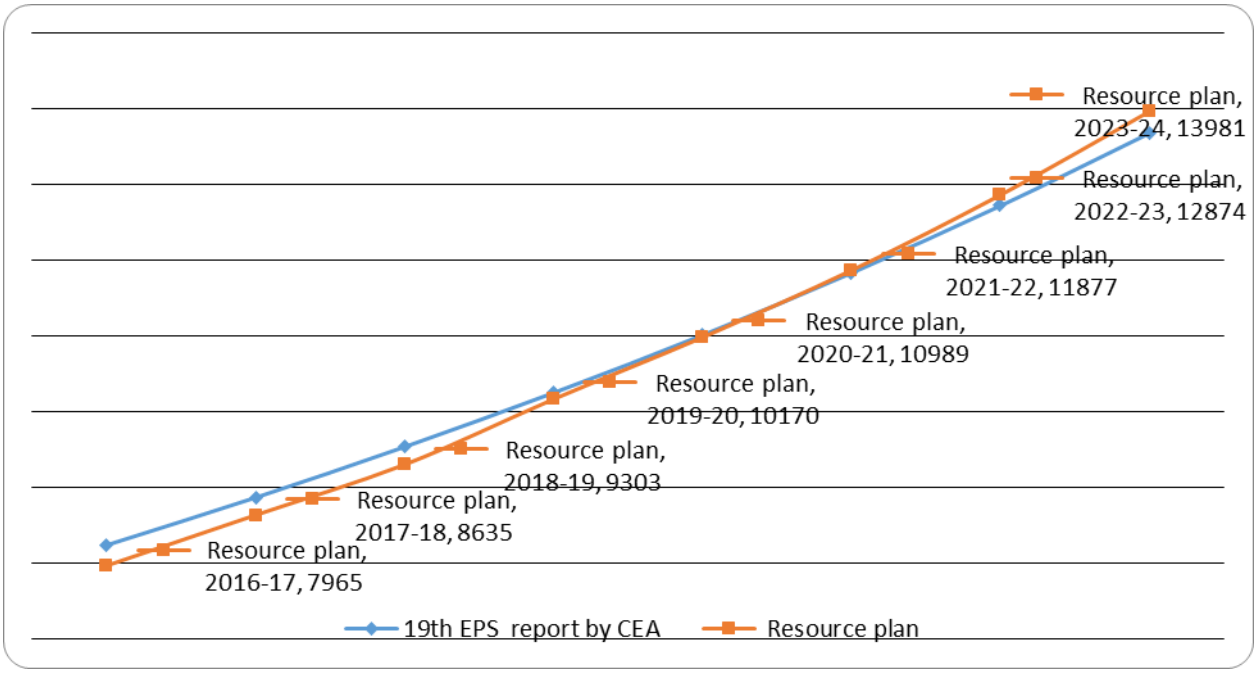

Figure 2

2 Power Procurement Plan

As per the guidelines for Resource plan submission, the licensee has to submit a power procurement plan for a period of two control periods which shall take into account all the available and possible generation sources and shall meet out the additional power required to meet the future energy demand.

2.1 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 balance 3rd control period (FY 2017-18 to FY 2018-19) and 4th 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.

2.2 APGENCO

The below table shows the projected 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
Dr. NTTPS – IV	500	500
SDSTPS – I	800	800
SDSTPS – II	800	800
TOTAL THERMAL	**4,410**	**4,410**
HYDEL		
Interstate projects:		
Machkund, Orissa	84	38.7
T.B. Station, Karnataka	57.6	26.6
State projects:		
Donkarayi	25	25

Source	Project Installed Capacity (MW)	Contracted Capacity -AP Share (MW)
Upper Sileru	240	240
Lower Sileru	460	460
Srisailam right bank PH	770	770
Nagarjunsagar right canal PH	90	90
PABM	20	20
Mini hydro	1	1
Nagarjunsagar Tail Pond	50	50
TOTAL HYDEL	**1,798**	**1,721**
TOTAL APGENCO	**6,208**	**6,131**

The below table captures the expected capacity addition of APGENCO Thermal and Hydel stations during the course of the next two control periods:

Source	Project Installed Capacity (MW)	Expected COD
THERMAL		
RTPP- IV	600	Oct-17
VTPS – V	800	Apr-20
SDSTPS Unit-3	800	Apr-20
TOTAL THERMAL	**2,200**	
HYDEL		
Interstate projects:		
Polavaram – 12 Units	960	Apr-22
TOTAL HYDEL	**960**	
TOTAL APGENCO	**3,160**	

An additional 3,160 MW of capacity of both hydel and thermal power plants is expected to be added by APGENCO along with Polavaram during the next two control periods.

2.2.1 Central Generating Stations

The licensee has 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, Neyveli Lignite Corporation Ltd ("NLC"), Madras Atomic Power Station ("MAPS"), 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 is as mentioned below for FY 2017-18. The percentage allocations are the tentative weighted average allocations as certified by SRPC every month.

Name of the Station	Capacity	AP Share	
	MW	MW	%
NTPC-(SR) Ramagundam I & II	2100	289	13.74%
NTPC-(SR) STAGE – Ramagundam- III	500	73	14.52%
NTPC-TALCHER-II	2000	183	9.16%
NLC TS II STAGE-I	630	48	7.55%
NLC TS II STAGE-II	840	84	9.96%
MAPS	440	17	3.90%
KAIGA 1 & 2	440	53	11.99%
KAIGA 3 & 4	440	56	12.74%
NTPC Simhadri Stage-I	1000	461	46.11%
NTPC Simhadri Stage-II	1000	221	22.13%
Vallur (JV) NTPC with TANGEDCO *	1500	95	6.34%
Tuticorin	1000	124	12.37%
Bundled power under JVNSM	-	385	-
TOTAL	**11890**	**2,089**	**17.57%**

Apart from the existing CGS stations, new CGS stations are expected to come up with which the licensee is expected to enter into PPA. The list of new CGS stations is given below.

Name of the Station	AP Share (MW)	Date of Commissioning (COD)
Kalapakkam	61	Apr-18
Kudigi - I & II	200	Apr-19
TOTAL	**261**	

2.2.2 APGPCL & APDISCOM gas based generating stations

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.

Project Name	Installed Capacity (MW)	AP Share (MW)
APGPCL - I	100	9
APGPCL - II	172	25
Godavari Gas Power Plant	217	217
Total	**489**	**251**

2.2.3 Independent Power Producers (IPP)

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 license will expire in Oct 2017. After the expiry of PPA with Lanco, Spectrum and BSES, the licensee has decided not to procure power from them.

The following IPP's are under commercial operation in the State:

Project Name	Installed Capacity (MW)	AP Share (MW)
GVK Extension	220	101
Vemagiri	370	171
Gautami	464	214
Konaseema	444	205
Total	**1,498**	**691 ***

* 40% GAS is considered subject to AIM Gas price.

The availability from these new IPPs is subject to availability of natural gas supply from KG D6 wells.

2.2.4 Non-Conventional Energy Sources (NCE)

The expected cumulative installed capacities of NCE projects in the state from FY 2017-18 to FY 2023-24 is given below:

NCE's – Installed Capacity (MW)	FY 2016-17 (Existing)	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
NCE - Bio-Mass	157	157	157	157	157	157	157	157
NCE – Bagasse	121	121	121	121	121	121	121	121

NCE's – Installed Capacity (MW)	FY 2016-17 (Existing)	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
NCE - Municipal Waste to Energy	6	6	42	57	63	63	63	63
NCE - Industrial Waste based power project	22	22	29	29	29	29	29	29
NCE - Wind Power	3,566	4,066	4,266	4,566	4,566	4,566	4,566	4,566
NCE - Mini Hydel	86	86	106	106	106	106	106	106
NCE - NCL Energy Ltd	8	8	8	8	8	8	8	8
NCE – Solar	601	601	601	601	601	601	601	601
NCE – Solar Parks	1,100	2,050	2,250	3,250	3,250	3,250	3,250	3,250
Total - NCE's	**5,666**	**7,116**	**7,580**	**8,895**	**8,901**	**8,901**	**8,901**	**8,901**

GoAP has targeted to set up 3,250 MW solar capacity through Solar Parks in Kurnool, Kadapa and Anantapur districts with the support of Govt. of India. As part of this, GoAP has entered MoU with NTPC on 16.09.2014 for setting up of 1000MW solar park in Anantapur dist. Subsequently as per the directions of GoAP, APDISCOMs had entered into PPAs with M/s NTPC for purchase of solar power from the proposed 250 MW (Phase-1) solar park at NP Kunta, Anantapur Dist. on 24.04.2015 and the 250 MW (Phase-1) was commissioned on 29.07.2016. The remaining capacity of 750 MW (Phase-2) will be commissioned by 31.3.2018. APEPDCL and APSPDCL have signed PPA with M/s NTPC for 1000 MW Mega Solar Power Park at Gani in Kurnool District in the ratio of 34.27% and 65.73% respectively. APDISCOMs have signed the PPA with M/s SECI for 500 MW solar park in Kurnool District. The plant is expected to be commissioned in January, 2018.

2.2.5 Other Sources

2.2.5.1 Srivathsa and LVS:

APTRANSCO had entered into a Power Purchase Agreement with LVS (36.8 MW) on 3rd January, 2009 for purchase of power in compliance with the Orders issued by Hon'ble Supreme Court and had entered into another Power Purchase Agreement with Srivathsa (17.20 MW) power plant. These projects have been allocated completely to APEPDCL. No availability has been considered from LVS.

Case-I Medium Term: AP Discoms have signed the PPA with KSK Mahanadi for 400 MW for 100% of its share from 15th June 2016 to May 31st 2021.

Case-I 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.

Hinduja Power Plant: The licensees have signed a long term PPA with Hinduja Power plant for 1,040 MW. The first unit of 520 MW was synchronized on 06-12-2015 and the COD was declared on 11-01-2016 and the second unit COD was declared on 03-07-2016.

2.3 Basis of estimation of Power procurement from various sources

The licensee expects to meet its power procurement from the above mentioned generation sources and a deficit in any year would be met by means of bilateral purchases.

The methodology adopted for meeting the power procurement is the energy availability from the following sources has been considered first.

- All existing generation sources
- Future generation sources with which the licensee has signed long term PPA like Case-I Long term, Hinduja etc.
- Future generation sources under the NCE bracket to ensure that the licensees meet their Renewable Power Purchase Obligations (RPPO)
- Future Hydel generation sources as they are expected to be cheaper sources of power
- Other Future generating stations including APGENCO thermal, gas, CGS, NCE

The Energy availability from old IPP's is currently very low due to insufficient gas availability. The PLF of these IPP's is expected to improve to nearly 40% by FY 2017-18 and would continue to operate at 40% PLF through the horizon period assuming that sufficient gas allocation would be made available to these IPP's. The new IPPs were stranded for want of natural gas.

For the upcoming plants, any delay in achieving fuel supply (either coal or gas) would delay the availability further.

Even though, the power procurement plan lists down the different sources of energy till FY 2023-24, the licensee does not have complete visibility of energy sources beyond FY 2018-19 for reasons like absence of PPA, absence of fuel linkages, non achievement of financial closure, land acquisition issues etc. The energy availability projections have been provided on a best estimate basis.

Considering the above assumptions, the energy availability from various sources has been computed which is summarized in the below sections.

2.3.1 APGENCO Thermal

The energy availability from the existing and upcoming stations has been computed based on 80% PLF. The auxiliary consumption for generation sources in the range of 500-600 MW has been taken as 7.5% while for generation sources with capacity >600 MW has been taken as 6.5% as per the existing regulations.

Energy Availability from APGENCO Thermal stations (MU)							
Energy Source	**FY 2017-18**	**FY 2018-19**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2022-23**	**FY 2023-24**
VTPS I	2,686	2,686	2,693	2,686	2,686	2,686	2,693
VTPS II	2,686	2,686	2,693	2,686	2,686	2,686	2,693
VTPS III	2,686	2,686	2,693	2,686	2,686	2,686	2,693
VTPS IV	3,241	3,241	3,250	3,241	3,241	3,241	3,250
RTPP I	2,678	2,678	2,686	2,678	2,678	2,678	2,686
RTPP II	2,678	2,678	2,686	2,678	2,678	2,678	2,686
RTPP III	1,339	1,339	1,343	1,339	1,339	1,339	1,343
VTPS V	-	-	-	5,242	5,242	5,242	5,256
RTTP IV	1,960	3,931	3,942	3,931	3,931	3,931	3,942
SDSTPS I	5,242	5,242	5,256	5,242	5,242	5,242	5,256
SDTSP II	5,242	5,242	5,256	5,242	5,242	5,242	5,256
SDSTPS III	-	-	-	5,242	5,242	5,242	5,256

Energy Availability from APGENCO Thermal stations (MU)							
Energy Source	**FY 2017-18**	**FY 2018-19**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2022-23**	**FY 2023-24**
Total	**30,439**	**32,410**	**32,499**	**42,894**	**42,894**	**42,894**	**43,012**

2.3.2 GENCO Hydel

Energy availability from Hydel sources is uncertain owing to its dependence on the rains. Hence, energy availability from existing Hydel sources of generation has been taken as the historical average of the last three years.

It has been observed over the past few years that the actual availability from hydel stations has been consistently lower than the value approved in the Tariff Orders issued by APERC. The table below shows the approved vs actual hydro energy availability from FY 2002-03 to FY 2013-14 (for erstwhile AP) and for FY 2014-15.

Year	Approved hydro energy availability in MU (As per Tariff Orders)	Actual hydro energy availability in MU	Variation between Approved and Actual hydro energy availability (%)
2002-03	6,999	3,337	-52%
2003-04	6,757	2,959	-56%
2004-05	6,423	5,267	-18%
2005-06	5,979	7,873	32%
2006-07	7,586	9,328	23%
2007-08	8,592	9,566	11%
2008-09	9,046	7,729	-15%
2009-10	8,969	5,499	-39%
2010-11	7,662	6,751	-12%
2011-12	8,238	6,221	-24%
2012-13	6,407	3,171	-50%
2013-14	7,057	6,761	-37%

Over the past 2 years, Hydel stations have generated lower energy than approved values because of increasing use of Hydel stations as Irrigation Projects as can be seen from the table below. The same has been factored in while projecting the availability for APGENCO Hydel stations

Year	Approved hydro energy availability in MU (As per Tariff Orders)	Actual hydro energy availability in MU	Variation between Approved and Actual hydro energy availability (%)
2014-15	-	3,408	-
2015-16	3,404	2,320	-32%

Energy Availability from APGENCO Hydel stations (MU)							
Energy Source	**FY 2017-18**	**FY 2018-19**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2022-23**	**FY 2023-24**
Machkund, Orissa	204	204	205	204	204	204	205
T.B. Station, Karnataka	47	47	47	47	47	47	47
Upper Sileru	462	462	463	462	462	462	463
Lower Sileru	997	997	999	997	997	997	999
Donkarayi	92	92	93	92	92	92	93
Srisailam right bank PH	579	579	580	579	579	579	580
Nagarjunsagar right canal PH	37	37	37	37	37	37	37
PABM	8	8	8	8	8	8	8
Mini hydro	2	2	2	2	2	2	2
Nagarjunsagar Tail Pond	152	152	152	152	152	152	152
Polavaram – 12 Units	0	0	0	0	0	2,281	2,338
Total	**2,579**	**2,579**	**2,586**	**2,579**	**2,579**	**4,860**	**4,924**

2.3.3 Central Generating Stations

The PLF of the CGS stations has been taken as per the actual performance in FY 2015-16 and FY 2016-17.

Energy Availability from CGS Stations (MU)							
Energy Source	**FY 2017-18**	**FY 2018-19**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2022-23**	**FY 2023-24**
NTPC-(SR) Ramagundam I & II	1,959	1,959	1,964	1,959	1,959	1,959	1,964
NTPC-(SR) STAGE – Ramagundam- III	509	509	510	509	509	509	510
NTPC-TALCHER-II	1,336	1,336	1,340	1,336	1,336	1,336	1,340
NLC TS II STAGE-I	225	225	226	225	225	225	226
NLC TS II STAGE-II	421	421	422	421	421	421	422
MAPS	101	101	102	101	101	101	102
KAIGA 1 & 2	393	393	394	393	393	393	394
KAIGA 3 & 4	395	395	396	395	395	395	396
NTPC Simhadri Stage-I	3,437	3,437	3,446	3,437	3,437	3,437	3,446
NTPC Simhadri Stage-II	1,594	1,594	1,599	1,594	1,594	1,594	1,599
Vallur (JV) NTPC with TANGEDCO	524	524	525	524	524	524	525
Tuticorin	864	864	867	864	864	864	867
Bundled Power under JVNSM	2,496	2,496	2,503	2,496	2,496	2,496	2,503
Kalapakkam	0	405	406	405	405	405	406
Kudigi - I & II	0	0	1,317	1,313	1,313	1,313	1,317
Total	**14,255**	**14,660**	**16,017**	**15,974**	**15,974**	**15,974**	**16,017**

2.3.4 APGPCL & APDISCOM gas based generating stations

The availability of APGPCL stations has been considered as per the actual performance of FY 2015-16 and FY 2016-17. The availability has been considered as around 36% for APGPCL-I and around 49% for APGPCL-II.

The availability for Godavari Gas Power Plant has been considered as 40% in line with the availability assumed for old gas based IPPs.

Energy Availability from APGPCL and Other Gas Stations (MU)							
Energy Source	**FY 2017-18**	**FY 2018-19**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2022-23**	**FY 2023-24**
APGPCL I	29	32	32	32	32	32	32
APGPCL II	103	85	85	85	85	85	85
Godavari Gas Power Plant	730	733	735	733	733	733	735
Total	**862**	**850**	**852**	**850**	**850**	**850**	**852**

2.3.5 IPP (Existing & New)

Due to ageing stations, the energy availability from old gas based IPPs has been considered to be around 40%. The availability from new IPPs (with a total contracted capacity of 691 MW) is subject to natural gas supply from M/s RIL. However, assuming that the gas supply scenario would improve, the PLF for these stations has been considered as 40%.

The expected energy availability from these IPPs based on the above assumption of PLF is listed in the following table:

Energy Availability from Other Gas Stations (MU)							
Energy Source	**FY 2017-18**	**FY 2018-19**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2022-23**	**FY 2023-24**
GVK Extension	347	347	348	347	347	347	348
Vemagiri	583	583	584	583	583	583	584
Gautami	750	750	752	750	750	750	752
Konaseema	717	717	719	717	717	717	719
Total	**2,397**	**2,397**	**2,403**	**2,397**	**2,397**	**2,397**	**2,403**

2.3.6 Non-Conventional Energy sources (NCE)

The energy availability from NCE sources for the next years factoring in the assumed PLF have been given in the following table:

Energy Availability from NCE Sources(MU)							
Energy Source	**FY 2017-18**	**FY 2018-19**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2022-23**	**FY 2023-24**
NCE - Bio-Mass	339	376	377	376	376	376	377
NCE - Bagasse	100	115	115	115	115	115	115
NCE - Municipal Waste to Energy	-	66	90	99	99	99	99
NCE - Industrial Waste based power project	34	46	46	46	46	46	46

Energy Availability from NCE Sources(MU)							
Energy Source	**FY 2017-18**	**FY 2018-19**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2022-23**	**FY 2023-24**
NCE - Wind Power	6,191	8,803	9,424	9,422	9,422	9,422	9,424
NCE - Mini Hydel	135	166	167	166	166	166	167
NCE - NCL Energy Ltd	11	5	5	5	5	5	5
NCE - Solar	1,261	998	1,002	998	998	998	1,002
NCE - Solar Parks	3,403	3,735	5,415	5,394	5,394	5,394	5,415
Total	**11,474**	**14,310**	**16,641**	**16,622**	**16,622**	**16,622**	**16,650**

2.3.7 Other sources

The below table lists down the energy availability from the following other sources

- Srivathsa
- LVS
- KSK Mahanadi, Corporate Power (Medium Term)
- Thermal Power Tech (Long Term)
- Hinduja

Energy Availability from IPPs-Others (MU)							
Energy Source	**FY 2017-18**	**FY 2018-19**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2022-23**	**FY 2023-24**
Srivathsa	58	57	57	57	57	57	57
LVS	0	0	0	0	0	0	0
KSK Mahanadi	2,593	2,593	2,600	2,593	0	0	0
Corporate Power	0	0	0	0	0	0	0
Hinduja	3,389	7,202	7,222	7,202	7,202	7,202	7,222
Thermal Power Tech	1,717	1,717	1,721	1,717	1,717	1,717	1,721
Total	**7,757**	**11,569**	**11,601**	**11,569**	**8,976**	**8,976**	**9,001**

2.3.8 Consolidated Power Procurement

The following table lists down the consolidated energy availability from various Energy sources

State	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
Energy Source	MU	MU	MU	MU	MU	MU	MU
APGENCO Thermal	30,439	32,410	32,499	42,894	42,894	42,894	43,012
APGENCO Hydel	2,579	2,579	2,586	2,579	2,579	4,860	4,924
APGPCL	862	850	852	850	850	850	852
CGS	14,255	14,660	16,017	15,974	15,974	15,974	16,017
IPPs	2,397	2,397	2,403	2,397	2,397	2,397	2,403
IPPs - Others	7,757	11,569	11,601	11,569	8,976	8,976	9,001
NCE Sources	11,474	14,310	16,641	16,622	16,622	16,622	16,650
Energy Availability	**69,763**	**78,775**	**82,599**	**92,884**	**90,291**	**92,572**	**92,859**
Energy Requirement	**57,490**	**61,938**	**66,818**	**72,200**	**78,030**	**84,584**	**91,854**
Surplus/(Deficit)	**12,272**	**16,837**	**15,781**	**20,683**	**12,261**	**7,987**	**1,005**

From the above table, it can be observed that the State would be Energy Surplus from FY 2017-18 onwards. However, this situation is dependent on the timely capacity addition as per the estimated timelines.

Chapter 2

APTRANSCO Transmission Plan (Resource Plan) for the FY 2016-17 TO FY 2018-19

July 2017

Resource Plan for FY 16-17 to FY 18-19

6.1 Introduction

The state is at present handling 55,160 MU (FY 2016-17) of energy & maximum demand reached is 7965 MW. This is likely to increase to 61,938 MU of energy & 9303 MW of peak demand by FY 2018-19. 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 commissioned Anugul-Srikakulam-Vemagiri 765 kV double circuit lines. Vemagiri - Chilakaluripet 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 substations at Srikakulam (Palasa).

APTRANSCO has drawn up investment plans of Rs. 14065 Crs. in the period FY 2016-17 to FY 2018-19.

This investment includes 5104 ckm of 400 KV, 4950 ckm of 220 kV lines and 1751 ckm of 132 kV lines towards transmission expansion and 18 numbers in 400 kV substations, 44 numbers in 220 kV substations and 60 numbers in 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 with 4 numbers 400 kV substations and 7 numbers 220KV substations.

6.2 Transmission Resource Plan from FY 2017 to FY2019

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 and investment required to ensure the transmission system which would be capable transmitting the planned generation to meet the forecast loads up to FY 2019. The proposed transmission system was evaluated for the load and generation conditions for FY 2019. The following system conditions are studied for FY 2019

- Peak Load Scenario
- Light Load Scenario

The system studies were carried out for the above scenarios and analyzed the transmission system required in FY 2017 and FY 2019.

The transmission investment plan is prepared based on the transmission network expansion plan developed and was based on load flow studies and short circuit studies. The detailed load flow studies are annexed.

This report envisages the various assumptions & standards adopted for conducting load flows & short circuit studies etc followed for preparation of Transmission Resource plan from FY2017 to FY2019. After conducting load flows, short circuit 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 765KV, 400KV and 220 KV lines and Substations are also depicted. Sub transmission plan comprises of 132KV network is also prepared and depicted. The detailed list of lines and substations proposed at 400 KV and 220KV are annexed.

6.3 The assumptions and standards adopted while conducting Load Flow studies for UHV (200KV and above) are shown below.

(A) Standard Transformer sizes:

The utility's standard Transformer Sizes

Voltage	ONAN Rating (MVA)	OFAF Rating (MVA)
765/400 KV*	900	1500
400 / 220 kV	190	315
220 / 132 kV	60	100

(B) Standard Conductor types:

Sl. No	Item	Conductor Type	Configuration
1	765 KV Line	Quad Bersimis	ACSR Bersimis,4/PH, 42/4.57 mm Al + 7/2.54 mm Steel
2	400 kV Lines	Twin Moose	ACSR Moose, 2/PH, 61/3.53mm
3	220 kV Lines	Single Moose	ACSR Moose, 1/PH, 61/3.53mm

(C) 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 Bersimis 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

Thermal Limits of Transmission Lines at Rated Voltage:

Conductor	40°C ambient 75 ° Cond. Temp Amp / MVA	45°C ambient 75 ° Cond. Temp Amp / MVA	40°C ambient 100 ° Cond. Temp Amp / MVA
765 KV Quad Bersimis ACSR *	804A/4261MVA	697A/3694MVA	
400 kV Twin Moose ACSR	1368 A / 948 MVA	1190 A / 825 MVA	1800 A / 1247 MVA
220 kV Zebra ACSR Moose ACSR	622 A / 237 MVA 684 A / 261 MVA	546 A / 208 MVA 595 A / 227 MVA	795 A / 303 MVA 900 A / 343 MVA

Notes:

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.

(D) 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 no. of Transformers adopted are four.

(E) 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 90 MVA.

(F) 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
765 KV	9000MVA
400 KV	2000 MVA
220KV	500 MVA
132 KV	250 MVA

(G) 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

(H) Power Factor of the Loads: All loads are assumed to have a power factor of 0.9, this being the minimum specified in the Code of Technical Interface.

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.

Outage of one transmission circuit

Outage of one Interconnecting Transformer or

Outage of one generator.

Outage of a *400 KV* DC *(Double Circuit AC)* line in case of evacuation for a generating station of 1000 MW and above located in a difficult terrain like seacoast susceptible to yearly cyclones

Outage of a single circuit 765 KV line

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

6.4 District wise load forecast

Discoms have projected their Circle wise demand forecast in Discoms Resource plan . District wise demand forecast from FY 2018 to FY 2019 is shown in the below table

DEMAND FORECAST (MW)		
Circle Name	**FY 2017-18**	**FY 2018-19**
Circle 1: Srikakulam	201	215
Circle 2: Vizianagaram	296	317
Circle 3: Visakhapatnam	909	987
Circle 4: Rajahmundry	654	704
Circle 5: Eluru	942	1,010
Circle 1: Vijayawada	747	833
Circle 2: Guntur	766	843
Circle 3: Ongole	512	552
Circle 4: Nellore	655	706
Circle 5: Tirupati	940	1,009
Circle 6: Kadapa	543	579
Circle 7: Anantapur	844	890
Circle 8: Kurnool	845	895
Total for state	**8,854**	**9,540**

6.5 Evacuation schemes at 400 KV and 220 KV

Capital Works of 400 kV and 220 KV Transmission Schemes are being taken up for,

1. Evacuation of power from the Power Projects,
2. System improvement i.e. to meet the additional load demand and for improvement of voltage profile, Voltage control and reduction of Transmission Losses.
3. Including the associated 220kV Lines & Substations

Capital works are mainly funded by JBIC (Japan), Power Finance Corporation Limited, Rural Electrification Corporation Limited & now recently from various Commercial Banks.

The new transmission schemes proposed for the control period FY 2016 -17 to FY 2018 -19 as per the Load Forecast and Power Procurement Plan as indicated.

Schemes proposed for evacuation of power (New Schemes) :

Comprehensive Wind Evacuation Scheme

1. 400 KV Hindupur SS Comprehensive Wind Evacuation Scheme (1300 MW)

is taken up for evacuation of power from the Hindupur , Ananthapur Dt .

- The scheme consists of the following transmission lines ,Power Transformers and associated bay extensions:
  a) 400/220 kV Substation with 4 Nos. 315 MVA PTRs,
  b) 400 kV D/C Quad Moose Line from 400KV Hindupur SS to Uravakonda 400 kV SS – 130km.
  c) 400 kV D/C Quad Moose Line from 400KV Hindupur SS to Chinakampalli 400 kV SS – 130km,
  d) 220 kV D/C Moose Line from 400 kV SS Hindupur to 220kV Penukonda SS – 50 km.
  e) 220 kV D/C Twin Moose Line from 400 kV SS Hindupur to 220kV Pampanurtanda SS – 70 km.
  f) 220 kV D/C Moose Line from 400 kV SS Hindupur to 220kV Pampanurtanda SS – 70 km.
  g) 220 kV D/C Twin Moose Line from 400 kV SS Hindupur to 220kV Hindupur/Gollapuram SS – 20 km,

2. 400 KV JAMMALMADUGU SS Comprehensive Wind Evacuation Scheme(950 MW) is proposed for evacuation of power from the 400 kV Jammalmadugu SS in Kadapa (Dt):

- The scheme proposal is as follows :

  a) 400/220/132 kV Jammalmadugu Substation with 3 Nos 315 MVA PTRs and 2x160 MVA PTRs
  b) 400 kV D/C Quad Moose Line from 400kV Jammalmadugu to Kurnool 400 kV SS – 120km.

c) 400 kV D/C Quad Moose Line from 400kV Jammalmadugu to Uravakonda (Ananthapur) 400 kV SS – 128 Km.
d) 220 kV D/C Moose Line from 400 kV SS Jammalmadugu to 220kV SS Tirumalaipally – 17 km.
e) 220 kV D/C Moose Line from 400 kV SS Jammalmadugu to 220kV Betamcherla SS –68 km.
f) 220 kV D/C Moose Line from 400 kV SS Jammalmadugu to 220kV Tadipatri SS – 40 km.
g) 220 kV D/C Moose Line from 400 kV SS Jammalmadugu to 220 kV Chakrayapet SS–70 km.
h) 220 kV D/C Moose Line from 400 kV SS Jammalmadugu to 220kV Porumamilla SS – 75 km.
i) 220 kV D/C Line from 400 kV SS Jammalmadugu to 220kV Jammalmadugu SS – 10 km

3. **400 KV Uravakonda SS Comprehensive Wind Evacuation Scheme (2095 MW)** is proposed for evacuation of power from the 400kV SS Uravakonda in Anantapur (Dt):

- The scheme proposal is as follows :

a) 400/220 kV Uravakonda Substation with 2x315 MVA & 2x500 MVA PTRs.
b) 400 kV D/C Quad Moose Line from Uravakonda (AnanatapurDt) to Mahabubnagar 400 kV SS – 190km.
c) 400 kV D/C Quad Moose Line from Uravakonda to Jammalamadugu 400 kV SS – 128km.
d) 220 kV D/C Twin Moose Line from 400 kV SS Uravakonda to 220kV Vajra Karur – 13 km.
e) 220 kV D/C Twin Moose Line from 400 kV SS Uravakonda to 220kV Borampalli – 55 km.
f) 220 kV D/C Twin Moose Line from 400 kV SS Uravakonda to 220kV Borampalli – 55 km, & 220KV SS Borampalli to Kalyandurg 220KV SS Twin Moose DC line – 15 km.
g) 220 kV D/C Twin Moose Line from 220 kV SS Vajrakarur to 220kV Anathapur – 60 km.

4. Extension of Krishnapatnam Power Transmission Schemes Stg2 (1X800MW) :

- The scheme proposal is as follows :

a) 400kV Quad Moose D/C Line from Krishnapatnam TPP to Chittoor 400/220 kV SS – 187 km.

5. Extension of Muddanur RTPP STG-IV (600MW) Power Transmission Scheme :

- The scheme proposal is as follows :
  a) 400kV D/C Twin Moose Line from Muddanur RTPP Stg IV to Chittoor 400/220 kV SS – 253 km

6. **HNPCL Power plant Evacuation Scheme(520X2 MW)** is proposed for evacuation of power from the M/s HNPCL Pvt. Ltd.(Hinduja PP) of 2X520 MW power plant in Vizag (Dt): The scheme proposal is as follows :

   a) 400/220 kV new Substation proposed at Kamavarapukota in West Godavari district with 2x315 MVA PTRs.
   b) 400kV D/C Twin Moose Line from HNPCL Power plant to proposed K. V.Kota 400 kV SS – 244 km.
   c) 400kV D/C Twin Moose Line from 400kV Vemagiri SS to 400kV Kamavarapukota SS-60 km.
   d) 400kV D/C Quad Moose Line from Kamavarapukota SS to Border point of A.P(Chinnakorukondi Suryapet) – 90 km

7. **Aspiri (1000MW) Wind Evacuation Scheme** is proposed for evacuation of power from the 400kV SS Aspiri in Kurnool (Dt):

   - The scheme proposal is as follows :

     a) 400/220 kV Aspiri Substation with 3 Nos 315 MVA PTRs.
     b) 400KV Quad Moose DC line from proposed Aspiri 400kV SS to 400 kV Kurnool – 80km.

8. **Gani (Panyam) (1000 MW) Solar Evacuation Scheme** is proposed for evacuation of power from the 400kV SS Gani (Panyam) in Kurnool (Dt):

   - The scheme proposal is as follows :
     a) 400kV Gani (Panyam) Substation with 3 Nos 500 MVA PTRs.

9. **N. P. Kunta (1000 MW) & Galiveedu (500 MW) Solar Evacuation Scheme** is proposed for evacuation of power from the 400kV SS N.P. Kunta in Ananthapur (Dt):

   - The scheme proposal is as follows :
     a) 400kV N.P Kunta Substation with 3 Nos 315 MVA PTRs.
     b) LILO TO Proposed N.P.KUNTA 400KV SS FROM CHINAKAMPALLI - HINDUPUR Quad Moose DC LINE-20km
     c) 220 kV D/C Twin Moose Line from 400 kV SS N.P. Kunta to proposed 220kV Kadiri SS – 40 km.

10. **Polavaram Hydro Electric Power Plant Evacuation Scheme (12X80 MW)** is proposed for evacuation of power from Polavaram HEP (12X80 MW) in West Godavari (Dt):

The scheme proposal is as follows:

a. 400kV Twin Moose Line from Polavaram HEP to Kamavarapukota 400 kV SS – 85 km

11. **VTS Stg -V (800 MW) Power Transmission Evacuation Scheme :**

The scheme proposal is as follows:

a) 400kV D/C Quad Moose Line from VTS Stg -IV to Sattenapalli 400 kV SS – 60 km.

12. **400 KV Uravakonda-2 SS Comprehensive Wind Evacuation Scheme (1400 MW)**

is taken up for evacuation of power from the Uravakonda-2 , Ananthapur Dt .

- The scheme consists of the following transmission lines ,Power Transformers and associated bay extensions:
  a) 400/220 kV Substation with 4 Nos. 315 MVA PTRs.
  b) 400 kV D/C Quad Moose Line from 400KV Uravakonda SS to Proposed Uravakonda-2 400 kV SS – 25 km.

13. **400 KV Talaricheruvu SS Comprehensive Solar Evacuation Scheme (500 MW)**

is taken up for evacuation of power from the Talaricheruvu, Ananthapur Dt .

- The scheme consists of the following transmission lines ,Power Transformers and associated bay extensions:
  a) 400/220 kV Substation with 3 Nos. 315 MVA PTRs,
  b) LILO to Proposed 400 kV Talaricheruvu SS from Jammalamadugu to Uravakonda Quad Moose D/C Line – 2 km.

14. **400 KV Mylavaram SS Comprehensive Solar Evacuation Scheme (1000 MW)**

is taken up for evacuation of power from the Mylavaram, Kadapa Dt .

- The scheme consists of the following transmission lines ,Power Transformers and associated bay extensions:
  a) 400/220 kV Substation with 3 Nos. 315 MVA PTRs,
  b) 400 kV Quad Moose D/C line from Jammalmadugu to Proposed Mylavaram 400kV SS – 10 km.

15. Sub-Stations Proposed for New Capital of A.P:

1) Eluru Substation:

a) 400kV Eluru Substation with 2 Nos 315 MVA PTRs.

b) LILO to Proposed Eluru 400kV SS from 400kV D/C Twin Moose Line Vemagiri – Sattenapalli – 20 km

2) Gudivada Substation:

c) 400kV Gudivada Substation with 2 Nos 500 MVA PTRs

d) 400kV D/C Quad Moose Line from Eluru 400kV SS to proposed Gudivada 400 kV SS – 40 km

e) 400kV D/C Quad Moose Line from proposed Chilakaluripeta 400kV SS to proposed Gudivada 400 kV SS – 103 km

3. Inavolu/Thullur Substation:

f) 400kV Inavolu/Thullur Substation with 2 Nos 500 MVA PTRs.

g) LILO to Proposed Inavolu/Thullur 400kV SS from VTS-Stg-V – Sattenapalli 400kV D/C Quad Moose Line – 28 km.

4. Chilakaluripet Substation:

h) 400kV Chilakaluripet Substation with 2 Nos 500MVA PTRs.

i) 400kV Quad Moose D/C Line from proposed Chilakaluripeta 400kV SS to proposed Gudivada 400 kV SS – 103 km

j) The 220/132kV Sub-Stations proposed for capital city are :

Amaravathi, Chilakaluripeta, Tadepalli, Malkapuram, Repalle, in Guntur District and Gannavaram , Machilipatnam in Krishna district.

6.6 Investment plan 220KV and 400 KV

The investments required for 220KV and 400 KV system arrived based on the cost data of APTransco are shown below.

FY	Sub-Stations		Transformers		Lines				Investments
	(Nos.)		(Nos.)		Feeders (Nos)		Ckm		Rs Crores
	400	220	400	220	400	220	400	220	
2017	5	16	12	16	24	51	2718	1846.7	**3635**
2018	3	17	4	34	10	53	904	1791	**3967**
2019	10	11	31	28	25	45	1482	1313	**2853**
Total	18	44	47	78	59	149	5104	4951	**10455**

6.7 132 KV Transmission System

The total number of new and augmented 132 KV substations as per the load requirement.

FY	2016-17	2017-18	2018-19	Total
No of 132 KV SS	11	25	24	60

FY	2016-17	2017-18	2018-19	Total
Addl. Length of 132 KV line in Ckm	**221.45**	**1016.40**	**513.28**	**1751.13**

The investments required (Rs Crores) for 132 KV substations and lines for the first control period (part) from FY2016-17 to FY2018-19 are as under.

FY	2016-17	2017-18	2018-19	Total
132 kV investments Rs Crores	277.89	1245.91	2197.24	3721.04

6.8 Transmission Investments

The total investments (Rs Crores) required for 132 KV,220 KV and 400 KV systems from FY2016-17 to FY 2018-19 after implementing the cash flows are tabulated below.

FY	2017	2018	2019	Total
132 KV	665	1626	1318	**3610**
220 & 400 KV	3635	3967	2853	**10455**
Total	**4300**	**5594**	**4171**	**14065**

6.9 Contingencies

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.

6.10 Circuit Breaker Interrupting Capability

Circuit Breaker interrupting capabilities, as per CEA guidelines and the APERC, are :

765 kV breakers : 50 KA
400 kV breakers : 63 KA
220 kV breakers : 40 KA
132 kV breakers : 31.5 KA.

6.10.1 Short Circuit Studies

Short Circuit studies were carried out for FY 2018-19, with the machines connected for the maximum thermal Generation schedule contributing to the fault levels. Generator Sub-transient reactances were used. No contribution from the interstate tie-lines was included.

All calculated fault levels at 400 kV and 220 kV buses were less than 90% of the Breaker Interrupting Capabilities. The fault levels at Vijayawada Thermal Power Station 220 kV bus which was 45KA for LLL fault and 53 KA for LG fault. Existing loads at VTPS needs to be diverted to another 220kv bus as there is double bus arrangement to reduce fault levels.

The 132 kV system modeled in these studies is limited to the Transformer 132 kV side load (with no 132 kV interconnections), plus a few buses connecting the Generation at the 132 kV level to the network. The 132 kV fault levels are within the breaker interrupting ratings.

The results of the Short Circuit Study are shown in Annexure.

Chapter 3

APTRANSCO Transmission Plan (Resource Plan) for 4th Control Period

July 2017

Resource Plan for 4th Control Period(FY19-20 to FY 20-24)

7.1 Transmission Resource Plan from FY 2020 to FY2024

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 Power System Master Plan for the state of Andhra Pradesh. The purpose of this report is to present a comprehensive summary of the process, assumptions, methodology, transmission network expansion plan and investment 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 transmission investment plan was prepared based on the transmission network expansion plan envisaged meeting load growth and various generation evacuation schemes 400KV and 220kV are depicted. The transmission expansion plan which includes 400KV and 220 KV lines and SS are also depicted. The 132KV transmission plan comprises of 132KV network is also prepared and depicted.

APTRANSCO has drawn up investment plans of Rs. 7972 Crs. in the period FY 2019-20 to FY 2023-24.

This investment includes 1756 ckm of 400 KV, 1050 ckm of 220 kV lines and 1614 ckm of 132 kV lines towards transmission expansion and 6 numbers of 400 kV substations, 20 numbers of 220kV substations and 112 numbers of 132kV substations.

7.2 The standards adopted while conducting Load Flow studies for UHV (200KV and above) are shown in chapter 6.2

7.3 Investment plan 220KV and 400 KV

The year wise No of substations, lines in ckm and corresponding investments (Rs crores) required for 765KV, 400KV and 220KV system arrived based on the cost data of APTransco are shown below.

FY	*2019-20*	*2020-21*	*2021-22*	*2022-23*	*2023-24*	*Total*
400KV						
SS NO	0	3	1	1	1	6
COST (IN LAKHS)	0	37143	12381	12381	12381	74286
220KV						
SS NO	2	2	4	3	9	20
COST	7138	7138	14276	10707	32121	71380
400KV						
LINE CKM	0	174	742	400	440	1756
COST	0	20714	86135	48000	52800	207649
220KV						
LINE CKM	60	200	220	150	420	1050
COST	3660	12200	13420	9150	25620	64050
TOTAL SS&LINE COST(CR)	107.98	771.95	1262.12	802.38	1229.22	4173.65

2.4 7.4 Transmission System (132 KV)

The transmission system at 132 kV level estimation is based on the load requirement.

The year wise total number of new 132 KV substations required in the second control period i.e. from FY 2020-2024 is tabulated below.

FY	2019-20	2020-21	2021-22	2022-23	2023-24	Total
No of 132 KV SS	18	30	20	22	22	112

The length of 132 KV lines in Ckm required in respect of DC, DC/SC and 2nd circuit stringing is tabulated below.

FY	2020	2021	2022	2023	2024	FY2020-24
Addl. Length of 132 KV line in Ckm	**353**	**440**	**241**	**115**	**465**	**1614**

7.4.1 Investments in 132KV system

The total Investments (Rs Crores) required for New, augmented 132 KV substations and 132 KV lines in the 4th control period i.e. from FY 2020-2024 is furnished below.

FY	2020	2021	2022	2023	2024	FY2020-24
Total Investments for 132 KV (Rs Crores)	**975.25**	**1033.24**	**528.27**	**432.83**	**829**	**3798.59**

7.5 Total Transmission Investments

The total investments (Rs Crores) required for 132 KV, 220 KV, 400 KV and 765 KV systems from FY2020 to FY 2024 are tabulated below.

FY	2019-20	2020-21	2021-22	2022-23	2023-24	Total
132 KV	975.25	1033.24	528.27	432.83	829	3798.59
220 KV	107.98	193.38	276.96	198.57	577.41	1354.30
400 KV	0.00	578.57	985.16	603.81	651.81	2819.35
Total	**1083**	**1805**	**1790**	**1235**	**2058**	**7972**

Tentative Transmission Network Expansion From FY2016-17 to FY2018-19
Year wise No. of Substations, Transformers and Lines in ckm(220KV and above)

FY	Sub-Stations		Transformers		Lines			
	(Nos.)		(Nos.)		Feeders (Nos)		Ckm	
	400	220	400	220	400	220	400	220
2017	5	16	12	16	24	51	2718	1847
2018	3	17	4	34	10	53	904	1791
2019	10	11	31	28	25	45	1482	1313
Total	18	44	47	78	59	149	5104	4950.67
Unit cost (lakhs)	**5455**	**1753**	**1877**	**506**	**1398**	**376**	**240**	**122**
			2329	**650**				

Investment Summary Rs Crores

FY	Sub-Stations INV		Transformers INV		Lines				Total	Cash flows			
					Feeders Inv.		Ckm Inv.		Total	Cur FY	Prev FY	Fut FY	Inv
	400	220	400	220	400	220	400	220	INV	0.5	0.3	0.2	
2017	272.75	280.48	225.24	95.36	335.52	189.52	2849.09	1170.97	5418.93	2709.46	925.28		**3634.75**
2018	163.65	298.01	75.0800	177.80	139.80	199.28	867.34	1163.31	3084.27	1542.14	1341.42	1083.79	**3967.34**
2019	545.50	192.830	618.03	144.56	349.50	169.20	1674.65	777.14	4471.41	2235.71	0.00	616.85	**2852.56**
Total	**981.90**	**771.32**	**918.35**	**417.72**	**824.82**	**558.00**	**5391.08**	**3111.42**	**12974.61**	**6487.30**	**2266.70**	**1700.64**	**10454.65**

Cash flows Rs crores

FY	132KV		Total	Cash Flows				Total
	SS	Lines	Inv.	Current FY	Prev FY	Inv.		400KV, 220 KV&132 KV
2017			277.89	166.73	498.36	**665.10**		**4299.84**
2018			1245.91	747.55	878.90	**1626.44**		**5593.79**
2019			2197.24	1318.34	0.00	**1318.34**		**4170.90**
Total			1931.62	1158.97	695.38	**3609.88**		**14064.53**

TENTATIVE TRANSMISSION EXPANSION PROGRAMME					
DURING FY 2016-2019					
SUB-STATIONS (220 KV AND ABOVE)					
SN	**DISTRICT**	**KV**	**FULL NAME**	**FY**	Type
1	VIZIANAGARAM	400	GARIVIDI	2016-17	L
2	E.GODAVARI	400	KAKINADA SEZ	2018-19	L
3	W.GODAVARI	400	KAMAVARAPUKOTA	2016-17	G
4	W.GODAVARI	400	ELURU	2018-19	L
5	KRISHNA	400	GUDIVADA	2018-19	L
6	GUNTUR	400	INAVOLU/THULLUR	2018-19	L
7	GUNTUR	400	CHILAKALURIPETA	2018-19	L
8	PRAKASHAM	400	PODILI	2017-18	S
9	CHITTOOR	400	KALIKIRI	2017-18	L
10	CHITTOOR	400	RACHAGUNNERI	2018-19	L
11	YSR KADAPA	400	JAMMALMADUGU	2016-17	G
12	YSR KADAPA	400	MYLAVARAM	2018-19	G
13	ANANTHAPUR	400	URAVAKONDA	2016-17	G
14	ANANTHAPUR	400	HINDUPUR	2017-18	G
15	ANANTHAPUR	400	URAVAKONDA-2	2018-19	G
16	ANANTHAPUR	400	TALARICHERUVU	2018-19	G
17	KURNOOL	400	GANI (PANYAM)	2016-17	G
18	KURNOOL	400	ASPIRI	2018-19	G

1	SRIKAKULAM	220	PYDIBHIMAVARAM	2017-18	L
2	VISAKHAPATNAM	220	KORUPROLU	2017-18	L
3	VISAKHAPATNAM	220	ACHUTAPURAM	2018-19	L
4	E.GODAVARI	220	AMALAPURAM	2018-19	L
5	E.GODAVARI	220	KAKINADA SEZ	2017-18	L
6	W.GODAVARI	220	ELURU	2018-19	L
7	W.GODAVARI	220	DUVVA	2017-18	L
8	KRISHNA	220	NUZIVEEDU	2017-18	L
9	KRISHNA	220	GANNAVARAM	2018-19	L
10	KRISHNA	220	MACHILIPATNAM	2018-19	L
11	GUNTUR	220	GUNTUR	2017-18	L
12	GUNTUR	220	AMARAVATHI	2018-19	L
13	GUNTUR	220	CHILAKALURIPET	2018-19	L
14	GUNTUR	220	TADEPALLI	2018-19	L
15	GUNTUR	220	MALKAPURAM	2017-18	L
16	GUNTUR	220	REPALLE	2017-18	L
17	GUNTUR	220	PIDUGURALLA	2018-19	L
18	PRAKASHAM	220	KANDUKUR(PRKSM)	2017-18	L
19	NELLORE	220	ATMAKUR	2017-18	L
20	NELLORE	220	RACHARLAPADU	2017-18	L
21	NELLORE	220	NAIDUPETA	2017-18	L
22	CHITTOOR	220	MADANAPALLI	2016-17	L
23	CHITTOOR	220	CHERVI	2018-19	L
24	CHITTOOR	220	KUPPAM	2016-17	L
25	CHITTOOR	220	THIMMAPURAM 220/11KV (LIS)	2016-17	L
26	YSR KADAPA	220	TIRUMALAIPALLY	2016-17	G
27	YSR KADAPA	220	BETAMCHERLA	2017-18	G
28	YSR KADAPA	220	CHAKRAYAPET	2016-17	G

29	YSR KADAPA	220	PORUMAMILLA	2016-17	G
30	YSR KADAPA	220	JAMMALAMADUGU	2016-17	G
31	YSR KADAPA	220	GODDUMARRI (220/11kV)	2016-17	L
32	ANANTHAPUR	220	VAJRAKARUR	2016-17	L
33	ANANTHAPUR	220	DHARMAVARAM	2017-18	L
34	ANANTHAPUR	220	GOLLAPURAM	2016-17	L
35	ANANTHAPUR	220	PENUGONDA	2018-19	G
36	ANANTHAPUR	220	PAMPANUR THANDA	2017-18	G
37	ANANTHAPUR	220	BORAMPALLI	2016-17	G
38	ANANTHAPUR	220	KADIRI	2017-18	L
39	ANANTHAPUR	220	SHAPURAM (SW.Stn)	2016-17	L
40	ANANTHAPUR	220	BOKASAMPALLI (220/132/33kV)	2016-17	L
41	ANANTHAPUR	220	SUBBARAYANIPALLI (220/33kV)	2016-17	L
42	ANANTHAPUR	220	MUTYALACHERUVU (220/132kV)	2016-17	L
43	KURNOOL	220	MUCHUMARRI (220/11kV)	2016-17	L
44	KURNOOL	220	ADONI	2017-18	L
			.		
L - LOAD , S- SYSTEM IMPROVEMENT G- GENERATION					

LIST OF 132kV SS PROPOSED DURING FY 2016-2019						
Sl. No	**District**	**Name of the SS**	**No. of Transformers**	**MVA**	**Estimated cost Rs. Lakhs**	**Target year of Commissioning**
1	Krishna	Gannavaram	2	47.5	845	2016-17
2	Anantapur	Tadimarri	2	47.5	824	2016-17
3	Anantapur	Taticherla	2	47.5	1322	2016-17
4	Kurnool	Mantralayam	2	32	657	2016-17
5	Chittoor	33 kV features at 132 kV Switching Station Noonegundlapalle	2	63	895	2016-17
6	Kurnool	Rudravaram	2	32	1150	2016-17
7	Visakhapatnam	Pedda Waltair	2	63	4751	2016-17
8	Vizianagaram	Saluru	2	32	1153	2016-17
9	Vizianagaram	Garbham	2	47.5	1408	2016-17
10	Srikakulam	Srikakulam Town	2	47.5	1003	2016-17
11	Prakasam	33KV features at 132KV SS Inkollu	2	32	710	2016-17
12	Visakhapatnam	Paderu	2	32	1153	2017-18
13	East Godavari	Mummidivaram	2	47.5	1515	2017-18
14	East Godavari	Gollapalem	2	63	1642	2017-18
15	East Godavari	Narayanapuram	2	63	1641	2017-18
16	Guntur	Veldurthy (Uppalapadu)	2	32	1119	2017-18
17	Prakasam	Anumulapalle	2	47.5	1406	2017-18
18	Nellore	Vinjamur	2	47.5	1385	2017-18
19	Nellore	Kallurupalli	2	63	1846	2017-18
20	Nellore	Katrayapadu	2	47.5	1346	2017-18
21	Nellore	Koruturu	2	47.5	1346	2017-18
22	Nellore	Kadivedu	2	63	1632	2017-18
23	Anantapur	Amarapuram	2	32	1119	2017-18
24	Anantapur	Mudigubba	2	32	1119	2017-18
25	Chittoor	Ramasamudram	2	63	1066	2017-18
26	Chittoor	Pachikapallam	2	32	1119	2017-18
27	Chittoor	Penumur	2	32	1119	2017-18
28	Chittoor	Kothapalli(Gudipala)	2	47.5	1406	2017-18
29	Chittoor	Pasuparthur	2	47.5	1415	2017-18
30	YSR Kadapa	132 kV features at Rajampet 220/33 kV SS	2	63	1455	2017-18
31	Chittoor	Yerpedu	2	160	1892	2017-18

32	Visakhapatnam	Chodavaram	2	47.5	792	2017-18
33	Guntur	Ponnuru	2	63	1409	2017-18
34	Nellore	Rapur	2	32	941	2017-18
35	Guntur	33 kV features at Rentachintala 220/132 kV Substation	2	32	770	2017-18
36	Guntur	GIS SS Amaravati	2	100	3100	2017-18
37	Guntur	AIIMS/Mangalagiri	2	160	2115	2018-19
38	Visakhapatnam	Ozone Valley	2	160	3430	2018-19
39	Visakhapatnam	Kapuluppada	2	160	3430	2018-19
40	West Godavari	Yernagudem	2	47.5	1385	2018-19
41	Vizianagaram	G Chodavaram	2	47.5	1376	2018-19
42	Krishna	Narasapuram	2	47.5	1429	2018-19
43	Krishna	GIS at Moghalrajpuram	2	47.5	2800	2018-19
44	Guntur	Yadavalli	2	32	1158	2018-19
45	Guntur	33 KV features at 220 KV Rentachintala SS	2	32	770	2018-19
46	Chittoor	V.Kota	2	47.5	1337	2018-19
47	YSR Kadapa	C.Orampadu	2	63	927	2018-19
48	YSR Kadapa	Kalasapadu	2	47.5	1415	2018-19
49	YSR Kadapa	T.Sundupalli	2	63	1657	2018-19
50	YSR Kadapa	Satellite City	2	63	1657	2018-19
51	YSR Kadapa	Brahmamgarimattam	2	32	1190	2018-19
52	Anantapur	33kV features at 132kV Switching station Nagalapuram	2	32	769	2018-19
53	Anantapur	33kV features at 220/132/33kV Boksampalli HNSS Substation	2	32	769	2018-19
54	Prakasam	Chinnarikatla	2	63	1657	2018-19
55	Prakasam	East Gangavaram	2	63	1657	2018-19
56	East Godavari	Jaggampeta	2	63	1657	2018-19
57	Krishna	Mylavaram	2	63	1657	2018-19
58	Anantapur	33kV features at 132KV LIS Madakasira	2	63	1659	2018-19
59	Guntur	GIS SS Achampeta	2	100	3100	2018-19
60	Guntur	GIS SS Dondapadu	2	100	3100	2018-19

TENTATIVE TRANSMISSION EXPANSION PROGRAMME
FOR THE PERIOD FY 2016-17 TO FY 2018-19
TRANSMISSION LINES (220 KV AND ABOVE)

All amounts in Rs. in Lakhs

SN	FY	DISTRICT	KV	FBNAME	TBNAME	LINE	IC	RKM	CKT	LINE_TYPE	COND TYPE	Est cost per km	Line cost	Est unit cost of Bay	Bays	Est Total Bay cost	Ckt km
1	2016-17	VISAKHAPATNAM	400	KALAPAKA (VZG)	GARIVIDI 400KV SS	KALAPAKA (VZG) TO PROPOSED GARIVIDI	L	113	D/C		Quad Moose	240	27120	699	4	2796	226
2	2016-17	VISAKHAPATNAM	400	HINDUJA THERMAL POWE PLANT	KAMAVARA PUKOTA 400KV SS	HINDUJA TPP TO PROPOSED KAMAVARAPUKOTA 400KV SS	G	244	D/C		Twin Moose	157	38308	699	4	2796	488
3	2016-17	W.GODAVARI	400	KAMAVARA PUKOTA	SURYAPET	KAMAVARAPUKOTA TO BORDER POINT(SURYAPET)	G	90	D/C		Quad Moose	240	21600	699	4	2796	180
4	2017-18	W.GODAVARI	400	VEMAGIRI	KAMAVARA PUKOTA	VEMAGIRI TOPROPOSED 400KV SS KAMAVARAPUKOTA	S	100	D/C		Twin Moose	157	15700	699	4	2796	200
5	2018-19	VISAKHAPATNAM	400	HINDUJA TPP-KAMAVARA PUKOTA CKT1	KAKINADA SEZ 400KV SS	LILO TO PROPOSED 400KV KAKINADA SEZ FROM HINDUJA TPP TO 400KV SS KAMAVARAPUKOTA CKT1	L	10	D/C	LILO	Twin Moose	157	1570	699	2	1398	20

6	2018-19	VISAKHAPATNAM	400	HINDUJA TPP-KAMAVARAPUKOTA CKT2	KAKINADA SEZ 400KV SS	LILO TO PROPOSED 400KV KAKINADA SEZ FROM HINDUJAT TPP TO 400KV SS KAMAVARAPUKOTA CKT2	L	10	D/C	LILO	Twin Moose	157	1570	699	2	1398	20
7	2018-19	W.GODAVARI	400	POLAVARAM HYDRO POWER STATION	KV KOTA 400KV SS	POLAVARAM HEPS TO KAMAVARAPUKOTA 400KV SS	G	85	D/C		Twin Moose	157	13345	699	4	2796	170
8	2018-19	W.GODAVARI	400	VEMAGIRI-SATTENAPALLI CKT1	ELURU 400KV SS	LILO OF VEMAGIRI - SATTENAPALLI CKT1 TO PROPOSED ELURU 400KV SS	L	10	D/C	LILO	Twin Moose	157	1570	699	2	1398	20
9	2018-19	W.GODAVARI	400	VEMAGIRI-SATTENAPALLI CKT2	ELURU 400KV SS	LILO OF VEMAGIRI - SATTENAPALLI CKT2 TO PROPOSED ELURU 400KV SS	L	10	D/C	LILO	Twin Moose	157	1570	699	2	1398	20
10	2018-19	KRISHNA	400	ELURU 400 KV SS	GUDIVADA 400 KV SS	ELURU 400 KV SS TO GUDIVADA 400 KV SS	S	40	D/C		Quad Moose	240	9600	699	4	2796	80
11	2017-18	GUNTUR	400	VTPS Stg V	SATTENAPALLI 400KVSS	VTPS Stg V TO SATTENAPALLI 400KV SS	G	60	D/C		Quad Moose	240	14400	699	4	2796	120
12	2018-19	GUNTUR	400	VTS Stg-V - SATTENAPALLI CKT-1	INAVOLU/THULLUR	LILO OF VTS Stg-V - SATTENAPALLI CKT-1 TO PROPOSED INAVOLU/THULLUR 400KV SS	L	28	D/C	LILO	Quad Moose	240	6720	699	2	1398	56

13	2018-19	GUNTUR	400	VTS Stg-V - SATTENAPALLI CKT-2	INAVOLU/THULLUR	LILO OF VTS Stg-V - SATTENAPALLI CKT-2 TO PROPOSED INAVOLU/THULLUR 400KV SS	L	28	D/C	LILO	Quad Moose	240	6720	699	2	1398	56
14	2018-19	GUNTUR	400	GUDIVADA 400KV SS	CHILAKALURIPETA 400 KV SS	GUDIVADA 400 KV SS TO PROPOSED CHILAKALURIPETA 400 KV SS	L	103	D/C		Quad Moose	240	24720	699	4	2796	206
15	2017-18	PRAKASAM	400	SATTENAPALLI 400KV SS	PODILI 400KV SS	SATTENAPALLI TO PROPOSED PODILI 400KV SS	S	110	D/C		Twin Moose	157	17270	699	4	2796	220
16	2016-17	CHITTOR	400	MUDDANUR (RTPP) Stg.IV	CHITTOR	RTPP(MUDDANUR) Stg IV 400KV TO CHITTOR 400KV SS	G	253	D/C		Twin Moose	157	39721	699	4	2796	506
17	2017-18	CHITTOR	400	MUDDANUR RTPP Stg.IV-CHITTOR CKT 1	KALIKIRI 400KV SS	LILO TO PROPOSED KALIKIRI 400KV SS FROM MUDDANUR-CHITTOR CKT 1	L	26	D/C	LILO	Twin Moose	157	4082	699	2	1398	52
18	2017-18	CHITTOR	400	MUDDANUR RTPP Stg IV-CHITTOR CKT 2	KALIKIRI 400KV SS	LILO TO PROPOSED KALIKIRI 400 KV SS FROM MUDDANUR-CHITTOR CKT 2	L	26	D/C	LILO	Twin Moose	157	4082	699	2	1398	52
19	2018-19	CHITOOR	400	KRISHNAPATNAM - CHITTOR CKT-1	RACHAGUNNERI 400 KV SS	LILO TO PROPOSED RACHAGUNNERI 400KV SS FROM KRISHNAPATNAM - CHITTOR CKT1	S	90	D/C	LILO	Quad Moose	240	21600	699	4	2796	180

20	2018-19	CHITOOR	400	KRISHNAPATNAM - CHITTOR CKT-2	RACHAGUNNERI 400 KV SS	LILO TO PROPOSED RACHAGUNNERI 400KV SS FROM KRISHNAPATNAM - CHITTORE CKT2	S	90	D/C	LILO	Quad Moose	240	21600	699	4	2796	180
21	2016-17	YSR KADAPA	400	JAMMALMADUGU/ KONDAPURAM	URAVAKONDA	PROPOSED JAMMALMADUGU TO PROPOSED URAVAKONDA	G	128	D/C		Quad Moose	240	30720	699	4	2796	256
22	2016-17	YSR KADAPA	400	JAMMALMADUGU/ KONDAPURAM	KURNOOL	PROPOSED JAMMALMADUGU TO KURNOOL SS CKTs 1&2	G	120	D/C		Quad Moose	240	28800	699	4	2796	240
23	2018-19	YSR KADAPA	400	JAMMALMADUGU/ KONDAPURAM	KURNOOL	PROPOSED JAMMALMADUGU TO KURNOOL SS CKTs 3&4	G	120	D/C		Quad Moose	240	28800	699	4	2796	240
24	2018-19	YSR KADAPA	400	JAMMALMADUGU/ KONDAPURAM	MYLAVARAM 400KV	JAMMALMADUGU TO PROPOSED MYLAVARAM 400KV SS	G	10	D/C		Quad Moose	240	2400	699	4	2796	20
25	2018-19	ANANTHAPUR	400	URAVAKONDA - JAMMALAMADUGU CKT-1	TALARICHERUVU 400KV SS	LILO TO PROPOSED TALARICHERUVU 400KV SS FROM URAVAKONDA - JAMMALAMADUGU CKT-1	G	1.00	D/C	LILO	Quad Moose	240	240	699	2	1398	2
26	2018-19	ANANTHAPUR	400	URAVAKONDA - JAMMALAMADUGU CKT-2	TALARICHERUVU 400KV SS	LILO TO PROPOSED TALARICHERUVU 400KV SS FROM URAVAKONDA - JAMMALAMADUGU CKT-2	G	1.00	D/C	LILO	Quad Moose	240	240	699	2	1398	2
27	2018-19	KURNOOL	400	KURNOOL	ASPIRI 400KV SS	KURNOOL TO PROPOSED ASPIRI 400KV SS	G	80	D/C		Quad Moose	240	19200	699	2	1398	160

28	2016-17	KURNOOL	400	JAMMALAMADUGU - KURNOOL CKT-1	GANI (PANYAM) 400KVSS	LILO TO PROPOSED GANI (PANYAM) 400KV SS FROM JAMMALMADUGU TO KURNOOL 400KV SS CKT1	G	20	D/C	LILO	Quad Moose	240	4800	699	4	2796	40
29	2016-17	KURNOOL	400	JAMMALAMADUGU - KURNOOL CKT-2	GANI (PANYAM) 400KVSS	LILO TO PROPOSED GANI (PANYAM) 400KV SS FROM JAMMALMADUGU TO KURNOOL 400KV SS CKT2	G	20	D/C	LILO	Quad Moose	240	4800	699	4	2796	40
30	2017-18	ANANTHAPUR	400	HINDUPUR	URAVAKONDA	PROPOSED HINDUPUR TO PROPOSED URAVAKONDA	G	130	D/C		Quad Moose	240	31200	699	4	2796	260
31	2016-17	ANANTHAPUR	400	URAVAKONDA	VELTUR(M.B.NAGAR)	PROPOSED URAVAKONDA TO VELTUR(M.B.NAGAR)	G	124	D/C		Quad Moose	240	29760	699	4	2796	248
32	2018-19	ANANTHAPUR	400	URAVAKONDA	URAVAKONDA-2(EXTN WIND	URAVAKONDA TO PROPOSED URAVAKONDA -2 400KV SS	G	25	D/C		Quad Moose	240	6000	699	4	2796	50
33	2016-17	YSR KADAPA	400	CHINAKAMPALLI - HINDUPUR PGCIL LINE CKT-1	N.P. KUNTA 400KV SS	LILO TO PROPOSED N.P.KUNTA 400KV SS FROM CHINAKAMPALLI - HINDUPUR CKT-1	G	30	D/C	LILO	Quad Moose	240	7200	699	4	2796	60
34	2016-17	YSR KADAPA	400	CHINAKAMPALLI - HINDUPUR PGCIL LINE CKT-2	N.P. KUNTA 400KV SS	LILO TO PROPOSED N.P.KUNTA 400KV SS FROM CHINAKAMPALLI - HINDUPUR CKT-2	G	30	D/C	LILO	Quad Moose	240	7200	699	4	2796	60

35	2016-17	NELLORE	400	KRISHNAPATNAM	CHITTOR	KRISHNAPATNAM TO CHITTOR	G	187	D/C		Quad Moose	240	44880	699	4	2796	374
36	2017-18	SRIKAKULAM	220	GARIVIDI 4OOKV	PYDIBHIMAVARAM	400KV SS GARIVIDI TO PROPOSED PYDIBHIMAVARAM SS	L	25	D/C		Single Moose	122	3050	188	4	752	50
37	2016-17	SRIKAKULAM	220	GARIVIDI 220KV SS	TEKKALI	GARIVIDI TO TEKKALI 2ND CKT STRNG	L	92	S/C		Single Moose	22	2024	188	2	376	92
38	2016-17	VIZIANAGARAM	220	GARIVIDI - PENDURTHY CKT-1	GARIVIDI 400KV SS	LILO TO PROPOSED GARIVIDI 400KV SS FROM GARIVIDI - PENDURTHY CKT-1	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
39	2016-17	VIZIANAGARAM	220	GARIVIDI - PENDURTHY CKT-2	GARIVIDI 400KV SS	LILO TO PROPOSED GARIVIDI 400KV SS FROM GARIVIDI - PENDURTHY CKT-2	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
40	2016-17	VIZIANAGARAM	220	ADR PALEM - BOBBILI CKT-1	GARIVIDI 400KV SS	LILO TO PROPOSED GARIVIDI 400KV SS FROM ADR PALEM - BOBBILI CKT-1	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
41	2016-17	VIZIANAGARAM	220	ADR PALEM - BOBBILI CKT-2	GARIVIDI 400KV SS	LILO TO PROPOSED GARIVIDI 400KV SS FROM ADR PALEM - BOBBILI CKT-2	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
42	2016-17	VIZIANAGARAM	220	GARIVIDI	BOBBILI 220KV SS	GARIVIDI TO PROPOSED BOBBILI 220KV SS	L	40	D/C		Single Moose	122	4880	188	4	752	80

43	2017-18	VISAKHAPATNAM	220	VSS - KAKINDA SC LINE	KORUPROLU 220KV SS	LLILO TO PROPOSED 220KV SS KROPROLU FROM VSS-KAKINADA SC LINE	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
44	2017-18	VISAKHAPATNAM	220	PARWADA - SAMARLAKOTA SC LINE	KORUPROLU 220KV SS	LLILO TO PROPOSED 220KV SS KROPROLU FROM PARWADA - SAMARLAKOTA SC LINE	L	16	D/C	LILO	Single Moose	122	1952	188	2	376	32
45	2017-18	VISAKHAPATNAM	220	KORUPROLU 220KV SS	BECL BULK LOAD	PROPOSED KORUPROLU 220KV SS TO M/s BRIGHTON ENERGY CORP.Ltd. (BECL) BULK LOAD 140MVA AT NAKKAPALLI	L	10	D/C		Single Moose	122	1220	188	4	752	20
46	2018-19	VISAKHAPATNAM	220	BRANDIX	ACHUTAPURAM SS	BRANDIX TO PROPOSED 220KV SS ACHUTAPURAM	L	8	D/C		Single Moose	122	976	188	4	752	16
47	2018-19	E.GODAVARI	220	KAKINADA SS	AMALAPURAM SS	KAKINADA TO PROPOSED AMALAPURAM SS	L	55	D/C		Single Moose	122	6710	188	4	752	110
48	2018-19	E.GODAVARI	220	VEMAGIRI - BHIMAVARAM (UNDI) CKT-1	AMALAPURAM SS	LILO TO PROPOSED AMALAPURAM 220KV SS FROM VEMAGIRI - BHIMAVARAM (UNDI) CKT-1	L	48	D/C		Single Moose	122	5856	188	4	752	96
49	2017-18	E.GODAVARI	220	SAMARLAKOTA	KAKINADA SEZ	SAMARLAKOTA (PDP) TO	L	60	D/C		Single Moose	122	7320	188	4	752	120

						PROPOSED 220KV SS KAKINDA SEZ											
50	2017-18	E.GODAVARI	220	KAKINADA SEZ	M/S. GAIL (PETRO CHEMICAL COMPLEX)	KAKINDA SEZ TO BULK LOAD M/S. GAIL	L	5	D/C		Single Moose	122	610	188	4	752	10
51	2018-19	W.GODAVARI	220	ELURU 400KV SS	ELURU 220KV SS	ELURU 400KV SS TO PROPOSED 220KV SS ELURU	L	15	D/C		Twin Moose	122	1830	188	4	752	30
52	2017-18	W.GODAVARI	220	BHIMADOLE	NUNNA	BHIMADOLE TO NUNNA 2ND CKT STRINGING	S	86	S/C		Single Moose	101	8686	188	2	376	86
53	2018-19	W.GODAVARI	220	BHIMADOLE - NUNNA CKT1	ELURU 220KV SS	LILO TO PROPOSED ELURU 220KV SS FROM BHIMADOLE - NUNNA CKT-1	L	15	D/C	LILO	Single Moose	122	1830	188	2	376	30
54	2018-19	W.GODAVARI	220	BHIMADOLE - NUNNA CKT2	ELURU 220KV SS	LILO TO PROPOSED ELURU 220KV SS FROM BHIMADOLE - NUNNA CKT-2	L	15	D/C	LILO	Single Moose	122	1830	188	2	376	30
55	2016-17	W.GODAVARI	220	VIJJESWARAM	NIDADAVOLU	2ND CKT STRNG VIJJESWARAM TO NIDADAVOLU	L	6	S/C		Single Moose	22	132	188	2	376	6
56	2017-18	W.GODAVARI	220	VEMAGIRI - BHIMAVARAM (UNDI) CKT-2	DUVVA	LILO TO PROPOSED 220KV SS DUVVA FROM VEMAGIRI - BHIMAVARAM (UNDI) CKT-2	L	2	D/C	LILO	Single Moose	122	244	188	2	376	4
57	2018-19	W.GODAVARI	220	BHIMAVARAM (UNDI) - GUDIWADA CKT-1	ELURU 400KV SS	LILO TO PROPOSED 400KV SS ELURU FROM BHIMAVARAM -	L	25	D/C	LILO	Single Moose	122	3050	188	2	376	50

						GUDIVADA CKT-1											
58	2018-19	W.GODAVARI	220	BHIMAVARAM (UNDI) - GUDIWADA CKT-2	ELURU 400KV SS	LILO TO PROPOSED 400KV SS ELURU FROM BHIMAVARAM - GUDIVADA CKT-2	L	25	D/C	LILO	Single Moose	122	3050	188	2	376	50
59	2017-18	KRISHNA	220	VTS - KAMAVARA PUKOTA SC LINE	NUZIVEEDU	LILO TO PROPOSED 220KV SS NUZIVEEDU FROM VTS - KAMAVARAPU KOTA SC LINE	L	12	D/C	LILO	Single Moose	122	1464	188	2	376	24
60	2016-17	KRISHNA	220	VTS - KAMAVARA PUKOTA SC LINE	400KV SS KAMAVARA PUKOTA	LILO TO PROPOSED 400KV SS KAMAVARAPUKOTA FROM VTS - KAMAVARAPU KOTA SC LINE	S	8	D/C	LILO	Single Moose	122	976	188	2	376	16
61	2017-18	KRISHNA	220	220KV SS KAMAVARA PUKOTA	400KV SS KAMAVARA PUKOTA	220KV KAMAVARAPU KOTA TO PROPOSED 400KV SS KAMAVARAPUKOTA	L	5	D/C		Single Moose	122	610	188	4	752	10
62	2018-19	KRISHNA	220	GUDIVADA 400KV SS	MACHILIPATNAM	GUDIVADA 400KV SS TO PROPOSED MACHILIPATNAM SS	L	50	D/C		Single Moose	122	6100	188	4	752	100
63	2018-19	KRISHNA	220	NUNNA - GUDIVADA CKT-1	400KV SS GUDIVADA	LILO TO 400KV SS GUDIVADA FROM NUNNA - GUDIVDA CKT -1	L	3	D/C	LILO	Single Moose	122	366	188	2	376	6

64	2018-19	KRISHNA	220	NUNNA - GUDIVADA CKT-2	400KV SS GUDIVADA	LILO TO 400KV SS GUDIVADA FROM NUNNA - GUDIVDA CKT-2	L	3	D/C	LILO	Single Moose	122	366	188	2	376	6
65	2018-19	KRISHNA	220	GUDIVADA 220KV SS	400KV SS GUDIVADA	GUDIVADA 220KV SS TO PROPOSED 400KV SS GUDIVADA	L	5	D/C		Single Moose	122	610	188	4	752	10
66	2018-19	KRISHNA	220	GUDIVADA 220KV SS-GUDIVADA 400KV SS CKT-1	GANNAVARAM	LILO TO PROPOSED GANNVARAM SS FROM GUDIVADA 220KV SS-GUDIVADA 400KV SS CKT-1	L	40	D/C	LILO	Single Moose	122	4880	188	2	376	80
67	2018-19	KRISHNA	220	GUDIVADA 220KV SS-GUDIVADA 400KV SS CKT-2	GANNAVARAM	LILO TO PROPOSED GANNVARAM SS FROM GUDIVADA 220KV SS-GUDIVADA 400KV SS CKT-2	L	40	D/C	LILO	Single Moose	122	4880	188	2	376	80
68	2016-17	KRISHNA	220	GUNADALA	NUNNA	GUNDALA TO NUNNA	L	9	D/C		Single Moose	122	1098	188	4	752	18
69	2017-18	GUNTUR	220	SATTENAPALLI 400KV SS	GUNTUR	SATTENAPALLI 400KV SS TO PROPOSED GUNTUR 220KV SS	L	28	D/C		Single Moose	122	3355	188	4	752	55
70	2017-18	GUNTUR	220	CHILAKALURIPETA 400 KVSS	GUNTUR	CHILAKALURIPETA 400KV SS TO PROPOSED GUNTUR SS	L	30	D/C		Single Moose	122	3660	188	4	752	60
71	2018-19	GUNTUR	220	SATTENAPALLI 400KV SS-PURCHUR	CHILAKALURIPETA 400 KVSS	LILO TO 400KV SS CHILAKALURIPETA FROM SATTENAPALLI 400KV SS TO	L	5	D/C	LILO	Single Moose	122	610	188	2	376	10

				CKT1		PURCHUR CKT 1											
72	2018-19	GUNTUR	220	SATTENAPALLI 400KV SS-PURCHUR CKT2	CHILAKALURIPETA 400 KVSS	LILO TO 400KV SS CHILAKALURIPETA FROM SATTENAPALLI 400KV SS TO PURCHUR CKT 2	L	5	D/C	LILO	Single Moose	122	610	188	2	376	10
73	2017-18	GUNTUR	220	GUNTUR SS	REPALLE	GUNTUR SS TO PROPOSED REPALLE 220KV SS	L	60	D/C		Single Moose	122	7320	188	4	752	120
74	2018-19	GUNTUR	220	INAVOLU 400 KV SS	AMARAVATHI	INAVOLU 400KV SS TO PROPOSED 220KV SS AMARAVATHI	L	7	D/C		Single Moose	122	854	188	4	752	14
75	2018-19	GUNTUR	220	VTS - TALLAPALLI CKT-2	AMARAVATHI	LILO TO PROPOSED 220KV SS AMARAVATHI FROM VTS - TALLAPALLI CKT-2	L	2	D/C	LILO	Single Moose	122	244	188	2	376	4
76	2018-19	GUNTUR	220	CHILAKALURIPETA 400 KV SS	CHILAKALURIPETA 220 KVSS	CHILAKALURIPETA 400KV SS TO PROPOSED 220KV SS CHILAKALURIPETA	L	25	D/C		Single Moose	122	3050	188	4	752	50
77	2017-18	GUNTUR	220	INAVOLU 400 KV SS	MALKAPURAM	INAVOLU 400KV SS TO PROPOSED 220KV SS MALKAPURAM	L	3	D/C		Single Moose	122	366	188	4	752	6
78	2017-18	GUNTUR	220	VTS - PODILI	MALKAPURAM	LILO TO PROPOSED	L	5	D/C	LILO	Single Moose	122	610	188	2	376	10

				CKT-1		MALKAPURAM 220KV SS FROM VTS-PODILI CKT-1											
79	2018-19	GUNTUR	220	MALKAPURAM	TADEPALLI	MALKAPURAM TO PROPOSED 220KV TADEPALLI SS (XLPE Cable)	L	6	D/C		Single Moose	122	732	188	4	752	12
80	2018-19	GUNTUR	220	VTS-TALLAPALLI CKT-3	PIDUGURALLA	LILO TO PROPOSED PIDUGURALLA 220KV SS FROM VTS-TALLAPALLI CKT-3	L	2	D/C	LILO	Single Moose	122	244	188	2	376	4
81	2018-19	GUNTUR	220	VTS-TALLAPALLI CKT-4	PIDUGURALLA	LILO TO PROPOSED PIDUGURALLA 220KV SSS FROM VTS-TALLAPALLI CKT-4	L	2	D/C	LILO	Single Moose	122	244	188	2	376	4
82	2017-18	PRAKASAM	220	PODILI 400KV SS	KANDUKUR(PRKSM)	PODILI 400KV SS TO PROPOSED KANDUKUR(PRKSM) 220KV SS	L	48	D/C		Single Moose	122	5856	188	4	752	96
83	2017-18	PRAKASAM	220	PODILI 220KV SS	PODILI 400KV SS	PODILI 220KV SS TO PROPOSED 400KV SS PODILI	L	10	D/C		Single Moose	122	1220	188	4	752	20
84	2017-18	PRAKASAM	220	PURCHUR - PODILI CKT1	PODILI 400KV SS	LILO TO PROPOSED PODILI 400KV SS FROM PURCHUR-PODILI 220KV LINE CKT 1	L	5	D/C	LILO	Single Moose	122	610	188	2	376	10
85	2017-18	PRAKASAM	220	PURCHUR - PODILI CKT2	PODILI 400KV SS	LILO TO PROPOSED PODILI 400KV SS FROM PURCHUR-PODILI 220KV LINE CKT2	L	5	D/C	LILO	Single Moose	122	610	188	2	376	10

86	2017-18	NELLORE	220	NELLORE-PODILI CKT1	ATMAKUR	LILO OF NELLORE-PODILI CKT1 TO PROPOSED ATMAKUR SS	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
87	2017-18	NELLORE	220	NELLORE-PODILI CKT2	ATMAKUR	LILO OF NELLORE-PODILI CKT2 TO PROPOSED ATMAKUR SS	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
88	2017-18	NELLORE	220	NELLORE - ONGLOE CKT-1	RACHARLAPADU	LILO OF NELLORE - ONGOLE CKT-1 TO PROPOSED RACHARLAPADU 220KV SS	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
89	2017-18	NELLORE	220	RACHAGUNNERI 400KV SS	NAIDUPET (MENAKURU)	RACHAGUNNERI 400KV SS TO PROPOSED NAIDUPET (MENAKURU) 200KV SS	L	40	D/C	LILO	Single Moose	122	4880	188	2	376	80
90	2016-17	NELLORE	220	MANUBOLU 400KV SS TO RENUGUNTA CKT 2	SULLURPET SS	LILO OF MANUBOLU 400KV SS - RENUGUNTA 220KV CKT 2 TO SULLURPET SS	L	30	D/C	LILO	Single Moose	122	3660	132	2	264	60
91	2016-17	CHITTOOR	220	PALAMNERU	MADANAPALLI	PALAMNERU TO PROPOSED MADANAPALLI SS	L	58	S/C		Single Moose	101	5858	188	2	376	58
92	2017-18	CHITTOOR	220	KALIKIRI 400KV SS	MADANAPALLI	PROPOSED KALIKIRI 400KV SS TO PROPOSED MADANAPALLI SS	L	40	D/C		Single Moose	122	4880	188	4	752	80
93	2018-19	CHITTOOR	220	RACHAGUNNERI 400KV SS	CHERIVI	RACHAGUNNERI 400KV SS TO PROPOSED CHERIVI 200KV	L	50	D/C		Single Moose	122	6100	188	4	752	100

						SS											
94	2018-19	CHITTOOR	220	SULLURPET	CHERIVI	SULLURPET SS TO PROPOSED CHERIVI 200KV SS	L	30	D/C		Single Moose	122	3660	188	4	752	60
95	2016-17	CHITTOOR	220	PALAMNERU	KUPPAM	PALAMNERU TO PROPOSED 220KV SS KUPPAM SS	L	75	D/C		Single Moose	122	9150	188	4	752	150
96	2017-18	CHITTOOR	220	KALIKIRI-CHITTOR SC LINE	KALIKIRI 400KV SS	LILO OF KALIKIRI - CHITTOR SC LINE TO PROPOSED KALIKIRI 400KV SS	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
97	2016-17	CHITTOOR	220	CHINAKAMPALLI - KALIKIRI SC LINE	THIMMAPURAM	LILO TO PROPOSED THIMMAPURAM 220/11 KV (HNSS-II) LIFT IRRIGATION SS FROM CHINAKAMPALLI - KALIKIRI SC LINE	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
98	2017-18	CHITTOOR	220	KALIKIRI 400KV SS	KALIKIRI 220KV SS	PROPOSED KALIKIRI 400KV SS TO KALIKIRI 220KV SS	L	10	D/C		Single Moose	122	1220	188	4	752	20
99	2018-19	CHITTOOR	220	RACHAGUNNERI 400KV SS	PFIL (65MVA)BULK LOAD	RACHAGUNNERI 400KV SS TO M/s PRAKASH FERRO INDUSTRIES PVT Ltd.(PFIL)BULK LOAD OF 65MVA	L	10	D/C		Single Moose	122	1220	188	4	752	20
100	2018-19	CHITTOOR	220	RACHAGUNNERI 400KV SS	SCSEZ AT SATYAVEEDU 220/11KV SS	RACHAGUNNERI 400KV SS TO SCSEZ SATYAVEEDU 220/11KV SS	L	55	D/C		Single Moose	122	6710	188	4	752	110

						BULK LOAD OF 150MVA											
101	2016-17	YSR KADAPA	220	JAMMALMADUGU 400KV SS	TIRUMALAIPALLY	PROPOSED JAMMALMADUGU 400KV SS TO PROPOSED TIRUMALAIPALLY SS	G	17	D/C		Single Moose	122	2074	188	4	752	34
102	2017-18	YSR KADAPA	220	JAMMALMADUGU 400KV SS	BETAMCHERLA	PROPOSED JAMMALMADUGU 400KV SS TO PROPOSED BETAMCHERLA SS	G	68	D/C		Single Moose	122	8296	188	4	752	136
103	2016-17	YSR KADAPA	220	JAMMALMADUGU 400KV SS	CHAKRAYAPET	PROPOSED JAMMALMADUGU 400KV SS TO PROPOSED CHAKRAYAPET SS	G	70	D/C		Single Moose	122	8540	188	4	752	140
104	2016-17	YSR KADAPA	220	JAMMALMADUGU 400KV SS	PORUMAMILLA	PROPOSED JAMMALMADUGU 400KV SS TO PROPOSED PORUMAMILLA SS	G	75	D/C		Single Moose	122	9150	188	4	752	150
105	2016-17	YSR KADAPA	220	JAMMALMADUGU 400KV SS	JAMMALAMADUGU	PROPOSED JAMMALMADUGU 400KV SS TO PROPOSED JAMMALAMADUGU 220KV SS	G	10	D/C		Single Moose	122	1220	188	4	752	20
106	2016-17	YSR KADAPA	220	PULIVENDULA	HINDUPUR	PULIVENDULA TO HINDUPUR	S	126	D/C		Single Moose	122	15372	188	4	752	252
107	2016-17	YSR KADAPA	220	PULIVENDULA-HINDUPUR CKT1	GOLLAPURAM	LILO TO PROPOSED GOLLAPURAM SS FROM	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20

						PULIVENDULA-HINDUPUR LINE CKT 1											
108	2018-19	YSR KADAPA	220	PULIVENDULA-HINDUPUR CKT2	GOLLAPURAM	LILO TO PROPOSED GOLLAPURAM SS FROM PULIVENDULA-HINDUPUR LINE CKT 2	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
109	2016-17	YSR KADAPA	220	RTPP (MUDDANAUR)	CHINAKAMPALLI	RTPP (MUDDANUR) TO CHINAKAMPALLI 3rd & 4th CKTs.	L	60	D/C		Single Moose	122	7320	188	4	752	120
110	2016-17	YSR KADAPA	220	YELLANUR	GADDAMVARIPALLI	YELLANUR SS TO PROPOSED GADDAMVARIPALLI SS	L	4.60	D/C		Single Moose	122	561.2	188	4	752	9
111	2016-17	YSR KADAPA	220	GADDAMVARIPALLI	GODDUMARRI	GADDAMVARIPALLI TO PROPOSED GODDUMARRI SS	L	9.11	D/C		Single Moose	122	1111	188	4	752	18
112	2016-17	YSR KADAPA	220	PULIVENDULA	MUTYALACHERUVU	PULIVENDULA TO PROPOSED MUTYALACHERUVU (LIS)	L	54.90	D/C		Single Moose	122	6698	188	4	752	110
113	2016-17	YSR KADAPA	220	MUDDANUR (RTPP)	BRAHMI INDUSTRIES	MUDDANUR TO PROPOSED 220/11KV BRAHMI IND. BULK LOAD OF 150MVA	L	25	S/C		Single Moose	101	2525	132	2	264	25
114	2018-19	ANANTHAPUR	220	HINDUPUR 400KV SS	PENUGONDA	HINDUPUR 400KV SS TO PROPOSED PENUGONDA 220KV SS(WIND)	G	50	D/C		Single Moose	122	6100	188	4	752	100
115	2017-18	ANANTHAPUR	220	HINDUPUR 400KV SS	PAMPANUR THANDA	URAVAKONDA 400KV SS TO PROPOSED PAMPANUR	G	70	D/C		Twin Moose	150	10500	188	4	752	140

						THANDA SS											
116	2017-18	ANANTHAPUR	220	HINDUPUR 400KV SS	PAMPANUR THANDA	URAVAKONDA 400KV SS TO PROPOSED PAMPANUR THANDA SS	G	70	D/C		Single Moose	122	8540	188	4	752	140
117	2017-18	ANANTHAPUR	220	HINDUPUR 400KV SS	HINDUPUR 220KV SS	PROPOSED HINDUPUR 400KV SS TO HINDUPUR 220KV SS	G	20	D/C		Twin Moose	150	3000	188	4	752	40
118	2016-17	ANANTHAPUR	220	URAVAKONDA 400KV SS	BORAMPALLI	PROPOSED URAVAKONDA 400KV SS TO PROPOSED BORAMPALLI SS	G	55	D/C		Twin Moose	150	8250	188	4	752	110
119	2016-17	ANANTHAPUR	220	URAVAKONDA 400KV SS	BORAMPALLI	PROPOSED URAVAKONDA 400KV SS TO PROPOSED BORAMPALLI SS	G	55	D/C		Twin Moose	150	8250	188	4	752	110
120	2016-17	ANANTHAPUR	220	URAVAKONDA 400KV SS	VAJRAKARUR	URAVAKONDA 400KV SS TO PROPOSED VAJRAKARUR 220KV SS	G	16	D/C		Twin Moose	150	2400	188	4	752	32
121	2016-17	ANANTHAPUR	220	BORAMPALLI	KALYANDURG	BORAMPALI 220KV SS TO KALYANDURG 220KV SS	S	15	D/C		Twin Moose	150	2250	188	4	752	30
122	2017-18	ANANTHAPUR	220	NPKUNTA 400 KV SS	KADIRI	N.P.KUNTA TO PROPOSED KADIRI SS	L	40	D/C		Twin Moose	150	6000	188	4	752	80
123	2017-18	ANANTHAPUR	220	THIRUMALAYAPALLI	DHARMAVARAM	THIRUMALAYAPALLI TO PROPSED DHARAMVARAM 220KV SS	L	84	D/C		Single Moose	122	10248	188	4	752	168

124	2016-17	ANANTHAPUR	220	SHAPURAM (Sw.Stn)	SUBBARAYANIPALLI	SHAPURAM TO PROPSOED SUBBARAYANIPALLI (LIS) 220KV SS	L	9.85	S/C		Single Moose	101	994.9	188	2	376	10
125	2016-17	ANANTHAPUR	220	SHAPURAM (Sw.Stn)	BOKSAMPALLI	SHAPURAM TO PROPSOED BOKSAMPALLI SS	L	7.3	D/C		Single Moose	122	890.6	188	4	752	15
126	2018-19	ANANTHAPUR	220	ANANTHAPUR	KALYANDURG	ANANTHAPUR TO KALYANDURG 2nd CKT Stringing	S	61	S/C		Single Moose	22	1342	188	2	376	61
127	2017-18	KURNOOL	220	GOOTY 400KV SS	ADONI	GOOTY 400KV SS TO PROPOSED ADONI SS	L	32	D/C		Single Moose	122	3904	188	4	752	64
128	2016-17	KURNOOL	220	400KV SS GANI (PANYAM)	POOLING SUBSTATIONS (PS1, PS2, PS3 & PS4)	400KV GANI SS (PANYAM) TO 220KV POOLING SUBSTATIONS (PS1, PS2, PS3 & PS4)	L	16	D/C		Single Moose	122	1952	188	4	752	32
129	2018-19	KURNOOL	220	GOOTY-ADONI CKT-1	ASPIRI	LILO TO PROPOSED ADONI SS FROM GOOTY-ADONI CKT1	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
130	2018-19	KURNOOL	220	GOOTY-ADONI CKT-2	ASPIRI	LILO TO PROPOSED ADONI SS FROM GOOTY-ADONI CKT-2	L	10	D/C	LILO	Single Moose	122	1220	188	2	376	20
131	2016-17	KURNOOL	220	MALAYALA	MUCHUMARRI	MALAYALA SS TO PROPOSED MUCHUMARRI (LIS) SS	L	12.50	S/C		Single Moose	101	1220	188	2	376	13
132	2016-17	KURNOOL	220	400/220KV NARNOOR	BRAHMANAKOTHUR	400KV NARNOOR SS TO PROPSOED BRAHMANAKOTHUR (LIS)	L	17.50	S/C		Single Moose	101	1220	188	2	376	18

Cost Data Source:

(a) 400 kV level : Based on data provided by CE/400 kV Construction

(b) 220kV and 132kV level: Based on data provided by CE/Construction

Note : S/C represented for DC/SC, D/C for double circuit, LILO for Line in Lineout

LIST OF 132kV LINES PROPOSED DURING FY 2016-2019					
Sl. No	**Name of Transmission line**	**Length in Ckt KM**	**Estimated cost Rs. Lakhs**	**Target year of Commissioning**	**Present status of implementation/ Criticalities if any**
1	132 kV DC/SC line from 220/132/33 kV Nunna substation to the proposed 132/33 kV Gannavaram substation	15.00	722	2016-17	Work under progress
2	132kV DC/SC line from 220/132/33 kV Pulivendula Substation to the proposed 132/33 kV Tadimarri Substation	48.00	2056	2016-17	Work under progress
3	2 nd circuit on 132kV Anantapur - Kalyandurg DC/SC line	63.00	1735	2016-17	Work under progress
4	132kV DC Line for LILO of 2 nd circuit of 132kV Anantapur - Kalyandurg to the proposed 132kV SS Taticherla	6.00			
5	132 kV DC/SC line from 132 kV Yemmiganur Substation to proposed 132 kV Mantralayam Substation	23.00	1066	2016-17	Work under progress

6	132kV LILO line from 132 kV Nandyal - Allagadda Circuit -II to the proposed 132/33 kV Rudravaram Substation	13.00	1413	2016-17	Work under progress
7	132/33 KV SS at Peddawaltair (Hybrid GIS) and connected 132 KV DC XLPE UG cable and overhead line from 220/132 KV Dairy Farm SS to proposed SS. (2 X 31.5 MVA PTR) (2.3km-OH, 3.5-Cable)	5.80	3000	2016-17	Work under progress
8	Erection of additional 2.15 Km of 132kV UG Cable from VUDA Park (Loc. No. 18 (old CTT)) to first location after VIMS (Loc. No. 6)	2.15			
9	132kV DC radial line from 220/132 kV Bobbili SS to the proposed 132/33 kV SS Salur	22.00	1628	2016-17	Work under progress
10	132kV LILO line from 132 kV Garividi - Bobbili Circuit -II to the proposed 132/33 kV Garbham Substation	0.50	261	2016-17	Work under progress
11	132kV DC/SC radial line from 132 kV Narsannapeta Substation to the proposed 132/33 kV Srikakulam Town Substation	23.00	1190	2016-17	Work under progress
12	132 kV DC radial line from 132 kV Araku substation to the proposed 132/33 kV Paderu substation	45.00	3300	2017-18	Work under progress
13	132kV DC radial line from proposed 220kV SS Amalapuram to the proposed 132 kV Mummidivaram substation	15.00	2514	2017-18	Tenders to be called
14	Erection of 132kV DC Line for making LILO of 132kV Ramachandrapuram – Amalapuram radial line to proposed	8.00			

	132/33 kV Mummidivaram SS				
15	Stringing of 2nd circuit on existing 132kV Kakinada – Yanam DC/SC Line	42.00	1521	2017-18	Tenders called
16	Erection of 132kV DC line for making LILO of 2nd circuit of 132kV Kakinada – Yanam line to the proposed 132/33 kV Gollapalem SS	6.00			
17	132kV LILO line from 132 kV Nidadavolu - Bhimadolu to the proposed 132/33 kV Narayanapuram Substation	2.00	518	2017-18	Work under progress
18	132kV DC/SC line from Macherla 132 kV SS to the proposed 132/33 kV Veldurthy Substation	21.00	1777	2017-18	Purchase order issued
19	132kV DC radial line from 132 kV Cumbum Substation to the proposed 132/33 kV Anumalapalle Substation	17.00	2240	2017-18	Tenders called
20	132 kV 2nd circuit stringing on existing 132 kV Cumbum - Giddalur DC/SC line	37.50			
21	132kV DC/SC radial line from proposed 220/132 kV Atmakur Substation to the proposed 132/33 kV Vinjamur Substation	25.00	2087	2017-18	PQB under circulation
22	132kV DC/SC radial line from 400/220 kV Manubolu Substation to the proposed 132/33 kV Kallurpalli Substation	25.00	2617	2017-18	Tenders uploaded
23	132kV DC radial line from proposed 220/132 kV Atmakur SS to the proposed 132/33 kV SS Katrayapadu	36.00	2687	2017-18	Tenders opened to be finalised

24	132kV DC radial line from proposed 132/33 kV Kallurpalli Substation to the proposed 132/33 kV Koruturu substation	25.00	1952	2017-18	Tenders uploaded
25	132kV DC radial line from 400/220/132kV SS Manubolu to the proposed 132/33 kV Kadivedu substation	25.00	2342	2017-18	Tenders to be called
26	132kV DC/SC line from Jammalabanda 132 kV Substation to the proposed 132/33 kV Amarapuram Substation	32.00	2613	2017-18	Purchase order issued
27	2 nd circuit on 132kV DC/SC line from Pulivendula 132/33 kV Substation to the Kadiri 132/33 kV Substation	29.00	2764	2017-18	Tenders to be called
28	132 kV DC/SC line from 132/33 kV Kadiri substation to the proposed 132/33 kV Mudigubba substation	25.00			
29	132 kV DC/SC line from 220/132/33 kV Madanapalli substation to the proposed 132/33 kV Ramasamudram substation	30.00	1511	2017-18	Work under progress
30	132kV DC/SC line from Nagari 220/132/33 kV Substation(Under construction) to the proposed 132/33 kV Pachikapallam Substation	40.00	3235	2017-18	LOI issued
31	132kV DC radial line from proposed 132/33kV Pachikapallam to the proposed 132/33 kV Penumur substation	20.00	2920	2017-18	Tenders called
32	2nd circuit stringing on 132kV DC/SC Line from 220/132kV SS Nagari to 132kV SS Pachikapallam	40.00			

33	132 kV DC radial line from 132 kV Noonegundlapalli switching station to the proposed 132/33 kV Kothapalli substation	25.00	2342	2017-18	Tenders called
34	132kV DC radial line from 220/132/33kV SS Palamaneru to the proposed 132/33 kV Pasuparthur substation	25.00	2468	2017-18	Tenders to be called
35	132kV DC Line with XLPE Cable from proposed Up-gradation of 132/33kV SS Tadepalli to 220/132/33kV SS to proposed 132kV SS AIIMS/Mangalagiri	9.00	7500	2017-18	Tenders to be called
36	132kV DC Line with XLPE UG Cable from 220/132kV SS Diary Farm to the proposed 132 kV GIS SS at Ozone Valley.	12.00	9954	2017-18	Tenders to be called
37	33kV 400sqmm 1 core copper XLPE Cable with terminal blocks (for 2 LVs)	2.00			
38	132kV DC Line with XLPE UG Cable from 220kV Diary Farm to the proposed 132 kV GIS SS at Kapuluppada.	14.00	11565	2017-18	Tenders to be called
39	33kV 400sqmm 1 core copper XLPE Cable with terminal blocks (for 2 LVs)	2.00			
40	132kV DC Linr from 400/220/132kV SS Rachagunneri to proposed 132kV SS Yerpedu	5.00	431	2017-18	Tenders called
41	132 kV DC/SC line from 132/33 kV Kasimkota substation to the proposed 132/33 kV Chodavaram substation	28.00	1412	2017-18	Work under progress
42	132kV DC radial line from proposed 220/132 kV Guntur Substation to the proposed 132/33 kV Ponnuru	35.00	2428	2017-18	Purchase order issued

	substation				
43	132kV DC radial line from 400/220/132 kV Manubolu Substation to the proposed 132/33 kV Rapur substation	40.00	2740	2017-18	Work under progress
44	stringing of 2nd circuit on 220kV Kamavarapukota – 132kV Chintalapudi DC/SC Line	28.00	643	2017-18	Work under progress
45	stringing of 2nd circuit on the existing 132kV Chilakaluripeta – 132kV Vinukonda DC/SC Line	52.00	1228	2017-18	Purchase order issued
46	stringing of 2nd circuit on 132kV Parchur - Chirala line	25.00	774	2017-18	PQB under circulation
47	stringing of 2nd circuit from 220kV SS Markapur to 132kV SS Kesinenipally	19.00	660	2017-18	LOI to be issued
48	2nd circuit stringing on existing 132 kV Markapur – Cumbum	32.00	901	2017-18	LOI to be issued
49	Stringing of 2nd circuit from 132kV SS Medarametla to 132kV SS Kanigiri	74.90	3364	2017-18	PQB under finalisation
50	132kV DC Line for LILO of 2nd circuit of 132kV Medarametla - Kanigiri line to 220kV SS Podili	15.00			
51	stringing of 2nd circuit on 132kV Narsannapeta – Srikakulam Town DC/SC Line	23.00	538	2017-18	Note under circulation for awarding contract to same contractor of 132kV SS Srikakulam
52	132kV DC Line with XLPE UG Cable from proposed 220/132/33kV SS Amaravati to the proposed 132/33kV SS Amaravati	5.00	4292	2017-18	TOO to be issued
53	Stringing of 2nd circuit on 132kV Uravakonda - Guntakal DC/SC Line	30.00	1718	2018-19	Tenders to be called

54	LILO of one circuit of 132kV Uravakonda - Guntakal Line to 220kV SS Vajrakarur	6.00			
55	a) Modification of 132kV Garividi - Palakonda line LILO to 132kV SS Ckilakapalem with M+0 Type Multi-circuit towers & b) Making 132kV Pydibhimavaram - Ponduru line through instead of LILO at 132kV SS Chilakapalem	1.00	121	2018-19	Work to be done by CE/Zone/Visakhapatnam
56	132kV DC line with XLPE UG Cable from 132kV SS Vijayawada to the proposed 132/33 kV GIS SS Moghalrajpuram	6.00	5698	2018-19	Tenders to be called
57	132kV DC/SC line from tapping point to the proposed 132/33 kV Yernagudem Substation	1.00	862	2018-19	Work under progress
58	2nd circuit stringing on 132 kV Nidadavolu - KV Kota line from 220kV SS Kamavarapukota to the proposed 132kV SS Yernagudem	38.00			
59	132kV DC/SC line from proposed 220/132 kV Pydibhimavaram Substation to the proposed 132/33 kV G.Chodavarm Substation	9.00	820	2018-19	Site to be finalised
60	132kV DC radial line from proposed 220/132 kV SS Nuzividu to the proposed 132/33 kV SS Narsapuram	25.00	2468	2018-19	Tenders opened
61	132kV DC radial line(UG Cable) from 220/132 kV Gunadala Substation to the proposed 132/33 kV GIS substation Moghalrajpuram	8.00	8777	2018-19	Tenders called

62	33kV 400sqmm 1 core copper XLPE Cable with terminal blocks (for 2 LVs)	2.00			
63	2 nd circuit on 132kV DC/SC line from Parchur 220/132 kV Substation to the Martur 132/33 kV Substation	19.28	2010	2018-19	Purchase order issued
64	132 kV DC/SC line from 132/33 kV Martur substation to the proposed 132/33 kV Yadavalli substation	18.00		2018-19	Purchase order issued
65	132kV DC/SC line from 220/132/33 kV Palamaneru Substation to the proposed 132/33 kV V.Kota Substation	42.00	3342	2018-19	Tenders to be called
66	132 kV DC/SC line from 220/132 kV Rajampet substation to the proposed 132/33 kV C. Orampadu substation	22.00	1137	2018-19	Tenders to be called
67	132kV DC radial line from proposed 220/132kV Porumamilla to the proposed 132/33 kV Kalasapadu substation	36.00	3422	2018-19	Tenders opened
68	132kV DC radial line from 132/33kV SS Rayachoti to the proposed 132/33kV SS T. Sundupalli	20.00	2028	2018-19	Tenders to be called
69	132kV DC radial line from 220/132kV SS Chinakampalli to the proposed 132/33kV SS Satellite city	30.00	2905	2018-19	Tenders to be called
70	132kV DC radial line from proposed 220/132kV SS Porumamilla to the proposed 132/33kV SS Brahmamgarimattam	15.00	1592	2018-19	Tenders to be called
71	132kV DC Radial line from 220/132kV SS Podili to proposed 132kV SS Chinnarikatla	26.00	2555	2018-19	Tenders to be called

72	132kV DC radial line from 220/132kV SS Podili to the proposed 132/33kV SS at East Gangavaram	21.00	2116	2018-19	Tenders to be called
73	132kV DC radial line from 220/132kV SS Samarlakota to the proposed 132/33kV SS at Jaggampet	20.00	2029	2018-19	Tenders called
74	132kV DC radial line from 220/132kV SS Kondapalli to the proposed 132/33kV SS at Mylavaram	25.00	2469	2018-19	Technical sanction approved. Tenders to be floated under World Bank
75	Stringing of 2nd circuit from 220kV SS Gollapuram to 132kV SS Lepakshi	15.00	2548.3	2018-19	Tenders not called
76	132kV DC line from 132kV SS Lepakshi to the proposed 132kV SS Palasamudram	20.00			
77	132kV DC Line with XLPE UG Cable from proposed 220/132/33kV SS Amaravati to the proposed 132/33kV SS Achampeta	32.00	25956	2018-19	TOO to be issued
78	132kV DC/SC Line with XLPE UG Cable from proposed 220/132/33kV SS Amaravati to the proposed 132/33kV SS Dondapadu	15.00	12325	2018-19	TOO to be issued
79	132kV DC/SC Line with XLPE UG Cable from proposed 220/132/33kV SS Malkapuram to the proposed 132/33kV SS Dondapadu	11.00	90725	2018-19	TOO to be issued

	UHV (220 kV and above) System: Transformers					(All amounts in Rs. In Lakhs)											
							2016-17			2017-18			2018-19				
SL.NO	HV	LV	FBusName	Sub-Station	Total_qty	Est. Unit Cost	2017_Qty	2017_Cost	2017_Type	2018_Qty	2018_Cost	2018_Type	2019_Qty	2019_Cost	2019_Type	Total_qty	Total_cost
1	400	220	GARIVIDI	GARIVIDI	2	1877	2		L							2	3754
2	400	220	KAKINADA SEZ	KAKINADA SEZ	2	1877							2		L	2	3754
3	400	220	KAMAVARAPUKOTA	KAMAVARAPUKOTA	2	1877	2		G							2	3754
4	400	220	ELURU	ELURU	2	1877							2		L	2	3754
5	400	220	GUDIVADA	GUDIVADA 500MVA	2	2329							2		L	2	4658
6	400	220	INAVOLU/THULLUR	INAVOLU/THULLUR 500MVA	2	2329							2		L	2	4658
7	400	220	CHILAKALURIPETA	CHILAKALURIPETA 500MVA	2	2329							2		L	2	4658
8	400	220	PODILI	PODILI	2	1877	2		S							2	3754
9	400	220	KALIKIRI	KALIKIRI	2	1877				2		L				2	3754

10	400	220	RACHA GUNNE RI	RACHAGU NNERI	2	1877							2		L	2	3754
11	400	220	JAMMAL AMADU GU	JAMMALA MADUGU	4	1877	2		G				2		G	4	7508
12	400	220	MYLAVA RAM	MYLAVARA M	3	1877							3		G	3	5631
13	400	220	URAVAK ONDA	URAVAKO NDA(2X500 , 2X315)	4	'1877 2329	2		G				2		G	4	8412
14	400	220	URAVAK ONDA-2	URAVAKO NDA-2	4	1877							4		G	4	7508
15	400	220	TALARIC HERUVU	TALARICH ERUVU	3	1877							3		G	3	5631
16	400	220	HINDUP UR	HINDUPUR	3	1877				2		G	1		G	3	5631
17	400	220	GANI (PANYA M)	GANI (PANYAM)	3	1877	2		G				1		G	3	5631
18	400	220	ASPIRI	ASPIRI	3	1877							3		G	3	5631
19	220	132	PYDIBHI MAVARA M	PYDIBHIMA VARAM	3	506				2		L	1		L	3	1518
20	220	132	KORUP ROLU	KORUPRO LU	2	506				2		L				2	1012
21	220	132	ACHUTA PURAM	ACHUTAPU RAM	2	506							2		L	2	1012
22	220	132	AMALAP URAM	AMALAPUR AM	3	506							3		L	3	1518
23	220	132	KAKINA DA SEZ	KAKINADA SEZ	3	506				2		L	1		L	3	1518

24	220	132	ELURU	ELURU	2	506							2		L	2	1012
25	220	132	DUVVA	DUVVA	3	506				2		L	1		L	3	1518
26	220	132	NUZIVEEDU	NUZIVEEDU	2	506				2		L				2	1012
27	220	132	GANNAVARAM	GANNAVARAM	2	506							2		L	2	1012
28	220	132	MACHILIPATNAM	MACHILIPATNAM	2	506							2		L	2	1012
29	220	132	GUNTUR	GUNTUR	3	506				2		L	1		L	3	1518
30	220	132	AMARAVATHI	AMARAVATHI	2	506							2		L	2	1012
31	220	132	CHILAKALURIPET	CHILAKALURIPET	2	506							2		L	2	1012
32	220	132	TADEPALLI	TADEPALLI	2	506							2		L	2	1012
33	220	132	MALKAPURAM	MALKAPURAM	2	506				2		L				2	1012
34	220	132	REPALLE	REPALLE	2	506				2		L				2	1012
35	220	132	PIDUGURALLA	PIDUGURALLA	2	506							2		L	2	1012
36	220	132	KANDUKUR(PRKSM)	KANDUKUR(PRKSM)	3	506				2		L	1		L	3	1518
37	220	132	ATMAKUR	ATMAKUR	2	506				2		L				2	1012
38	220	132	RACHARLAPADU	RACHARLAPADU	2	506				2		L				2	1012

39	220	132	NAIDUPETA	NAIDUPETA	2	506				2		L				2	1012
40	220	132	MADANAPALLI	MADANAPALLI	2	506	2		L							2	1012
41	220	132	CHERVI	CHERVI	2	506							2		L	2	1012
42	220	132	KUPPAM	KUPPAM	2	506	2		L							2	1012
43	220	132	TIRUMALAIPALLY	TIRUMALAIPALLY (160)	2	650	2		G							2	1300
44	220	132	BETAMCHERLA	BETAMCHERLA (160)	2	650				2		G				2	1300
45	220	132	CHAKRAYAPET	CHAKRAYAPET (160)	2	650	2		G							2	1300
46	220	132	PORUMAMILLA	PORUMAMILLA (160)	2	650	2		G							2	1300
47	220	132	JAMMALAMADUGU	JAMMALAMADUGU (160)	2	650	2		G							2	1300
48	220	132	DHARMAVARAM	DHARMAVARAM	2	506				2		L				2	1012
49	220	132	GOLLAPURAM	GOLLAPURAM	2	506	2		L							2	1012
50	220	132	PENUGONDA	PENUGONDA (160)	2	650							2		G	2	1300
51	220	132	PAMPANUR THANDA	PAMPANUR THANDA (160)	2	650				2		G				2	1300
52	220	132	BORAMPALLI	BORAMPALLI (160)	2	650	2		G							2	1300

53	220	132	KADIRI	KADIRI	2	506				2		L				2	1012
54	220	132	ADONI	ADONI	2	506				2		L				2	1012

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BUS ID	Zone	kV Base	V sol [pu]	Ang sol [deg]
201	13	220	0.986	-3
202	5	220	0.975	-5.5
203	4	220	0.99	-3.8
204	11	220	0.984	-2.8
206	11	220	0.997	-1.5
207	10	220	1	-8.8
208	4	220	1.001	-5.6
209	6	220	0.999	-4
211	7	220	0.994	-3.6
212	12	220	0.995	-0.5
213	2	220	0.956	-5.5
214	3	220	0.988	-2.1
216	6	220	1.002	-2.7
218	4	220	1	-6.6
221	9	220	0.985	-4.4
223	8	220	0.957	-7.7
227	9	220	1	-5.2
229	13	220	1	-4.7
230	7	220	1	-5.4
231	3	220	1.001	-4.3
232	4	220	0.991	-3.8
233	3	220	0.991	-1.8
234	3	220	0.992	-1.6
235	6	220	1.002	-2.7
238	12	220	0.995	-0.3
239	10	220	0.998	-6.1
242	11	220	0.986	-3.3
243	11	220	0.983	-3.8
244	12	220	1.002	0.6
246	3	220	0.981	-3
249	10	220	0.983	-5.5
251	13	220	0.99	-2.9
254	8	220	0.975	-6.5
256	11	220	1.002	0.8
257	11	220	0.997	0.5
258	12	220	0.999	1.5
260	12	220	1.004	1.3
261	13	220	0.976	-4.3
262	6	220	1	-4
263	12	220	1.001	0.6
264	11	220	0.982	-5
266	4	220	0.995	-3.5
267	4	220	0.991	-4.8

274	4	220	0.987	-5.1
276	6	220	1	-5.3
277	4	220	0.988	-4
278	12	220	0.991	-0.7
282	5	220	0.985	-4.3
287	13	220	0.993	-2.4
290	6	220	1.002	-2.6
293	6	220	0.981	-5.8
297	3	220	0.993	-1.4
298	4	220	0.99	-3.6
301	12	220	1.007	3.2
303	4	220	0.989	-2.7
304	3	220	0.989	-2
305	8	220	0.986	-7.1
307	4	220	0.989	-2.6
317	9	220	0.991	-3.5
318	10	220	0.998	-7.1
324	12	220	0.995	0.2
325	12	220	0.995	0.5
326	3	220	0.982	-2.8
327	5	220	0.967	-6.6
329	4	220	0.986	-4.4
330	1	220	0.93	-8.9
331	12	220	0.992	0
333	4	220	0.975	-6.1
335	5	220	0.983	-2.8
338	7	220	0.996	-3.4
340	8	220	0.977	-6.2
341	10	220	0.989	-8.4
357	12	220	0.989	0.6
367	10	220	0.984	-6.7
368	12	220	0.993	-0.4
377	9	220	0.976	-5.7
380	7	220	0.987	-4.9
381	7	220	0.988	-4.8
387	6	220	0.999	-4
392	8	220	0.95	-8.2
396	12	220	0.995	-0.3
399	11	220	0.994	-0.2
401	11	400	1	-1.8
404	7	400	1	-4
405	12	400	1	0.4
406	6	400	1	-0.7
407	3	400	1	2
410	13	400	1	2.3
412	3	400	1	2

414	3	400	1.001	2.1
415	4	400	1.001	2.1
416	4	400	1.007	0.6
417	4	400	1.007	0.6
419	4	400	1.007	0.6
421	10	400	1	-4.1
422	9	400	1	0.9
427	6	400	1	-1.5
432	7	400	1	-2.3
441	12	400	1.009	1.1
481	4	400	1.006	1.3
482	4	400	1.006	0.8
490	4	400	1.007	0.7
511	5	400	1	0.1
515	9	400	1.002	2.6
517	8	400	0.994	-3.7
518	10	400	1.002	-1.9
519	11	400	1.009	0
529	9	400	1.001	1
535	5	400	1.002	0.9
541	9	400	1.004	2.1
542	13	400	1.001	2.3
545	7	400	1.003	-4
547	6	400	1.001	-0.3
552	2	400	0.989	-0.6
553	12	400	1	3.2
554	10	400	1.006	-3.3
555	11	400	1.006	2.9
556	3	400	1	2.1
558	13	400	1.001	2.2
559	12	400	1.006	-0.7
561	5	400	1.005	-2.7
562	6	400	1.005	-3.3
563	13	400	1.003	2.7
564	9	400	1.004	1.8
565	9	400	1.004	2.1
566	9	400	1.003	1.9
567	9	400	1.003	1.9
568	7	400	1	-1.8
569	9	400	1.006	1.9
572	12	400	1.006	3.1
573	12	400	1.001	3.6
574	11	400	1.006	3
575	4	400	0.999	0.1
605	5	220	0.982	-5.3
606	10	220	0.993	-5.4

607	13	220	0.994	1.3
615	3	220	0.99	-1.9
622	8	220	0.976	-6.4
623	13	220	1	-3.2
624	13	220	0.988	-2.1
634	13	220	0.988	-2.1
635	13	220	0.987	-2.2
636	13	220	0.986	-2.3
637	13	220	0.985	-2.3
639	13	220	0.999	-3.3
642	5	220	0.985	-2.6
643	3	220	0.988	-2.2
645	7	220	1	-4.5
646	10	220	0.991	-4.9
656	10	220	0.991	-4.9
657	13	220	0.99	-1.9
662	3	220	0.99	-3.5
663	4	220	0.97	-3.6
665	5	220	0.979	-4.9
667	7	220	0.979	-5.9
668	10	220	0.974	-9.8
686	11	220	0.997	0.6
687	11	220	0.998	0.7
688	11	220	0.998	0.7
689	11	220	0.998	0.6
690	11	220	0.997	0.6
691	9	220	0.987	-4
692	9	220	0.986	-4
704	12	220	1	-2.4
705	7	220	1	-4.3
709	10	220	0.999	-5.4
710	10	220	0.999	-6.9
723	1	220	0.965	-4.4
724	2	220	0.964	-4.5
734	7	220	0.977	-6.1
756	13	220	0.998	-3.4
758	7	220	0.995	-5
762	4	220	0.994	-1.7
763	2	220	0.98	-3.1
764	3	220	0.991	-2.2
765	3	220	0.992	-3.5
766	3	220	0.997	-1.7
768	6	220	0.989	-5.4
769	6	220	0.981	-3.6
770	10	220	0.999	-5.6
771	11	220	1.007	0.7

774	2	220	0.973	-3.6
775	12	220	1.002	3.8
776	10	220	1	-6
777	11	220	0.999	1.7
778	12	220	1.002	1.8
779	12	220	1.003	2.8
780	11	220	0.997	1.6
781	11	220	0.997	2
782	11	220	0.996	1.8
783	11	220	0.997	2.1
784	11	220	0.998	1.6
785	12	220	1.001	3.5
786	12	220	1.005	3.7
787	10	220	0.982	-5.5
788	12	220	1.002	0.6
789	12	220	1.002	0.5
790	12	220	1.002	0.6
791	13	220	0.999	1.7
792	12	220	1.001	1.2
793	12	220	0.998	0.8
794	6	220	0.987	-5.3
797	9	220	0.981	-5.7
798	5	220	0.961	-6.9
799	7	220	0.997	-3.4
800	4	220	0.973	-3.3
801	9	220	0.967	-6.2
805	5	220	0.983	-5.3
806	6	220	0.996	-4.5
807	7	220	0.984	-5.6
810	7	220	0.964	-7.1
811	7	220	0.996	-3.5
812	13	220	1.001	4.2
816	7	220	0.997	-3.4
817	3	220	0.986	-2.3
824	12	220	1.004	3.5
825	12	220	1	4.9
826	11	220	1.003	3.9
951	13	765	1	3.8
954	9	765	1.022	2.6
1006	4	132	0.956	-9.3
1007	13	132	0.963	-6.5
1009	3	132	0.981	-4.1
1011	12	132	0.981	-1.6
1015	5	132	0.937	-10
1018	5	132	0.946	-8.9

1019	4	132	0.978	-7
1025	11	132	0.961	-5.4
1030	6	132	0.972	-8.5
1032	10	132	0.994	-11.3
1039	6	132	0.988	-7
1045	7	132	0.981	-5.8
1047	12	132	0.986	-1.3
1048	12	132	0.978	-2.2
1049	2	132	0.937	-8.2
1050	3	132	0.98	-4.8
1051	12	132	0.994	-2.5
1052	12	132	1.001	1.1
1060	4	132	0.968	-8.4
1061	6	132	0.98	-5.1
1062	12	132	0.984	-1.5
1066	10	132	0.979	-9.3
1081	5	132	0.954	-6.1
1082	9	132	0.948	-9
1088	3	132	0.999	-2.4
1095	13	132	0.957	-7.6
1096	3	132	0.994	-4.7
1101	9	132	0.967	-7.3
1105	9	132	0.967	-7.3
1109	8	132	0.923	-11.6
1112	7	132	0.973	-7.5
1113	4	132	0.967	-5.3
1116	10	132	0.982	-10.9
1117	6	132	0.969	-8.2
1120	8	132	0.946	-9.7
1122	11	132	0.972	-2.7
1123	10	132	0.97	-8.3
1129	10	132	0.954	-8.8
1140	9	132	1.009	-7.6
1144	12	132	0.983	-0.1
1145	13	132	0.985	-6.4
1148	2	132	0.968	-5.2
1150	12	132	0.988	-1.9
1152	1	132	0.91	-13.5

1160	11	132	0.978	-1.7
1190	6	132	0.971	-8.1
1197	3	132	0.961	-5.4
1198	12	132	1.038	0.9
1309	6	132	0.963	-8.2
1312	11	132	0.969	-5.5
1318	5	132	0.966	-7.5
1322	7	132	0.97	-6.3
1346	11	132	1.021	-2.2
1356	4	132	0.979	-9.3
1373	8	132	0.989	-9.6
1375	6	132	0.977	-8
1382	4	132	0.98	-9.3
1385	3	132	0.997	-4.7
1388	3	132	0.975	-3.6
1390	7	132	0.964	-7.5
1408	3	132	0.967	-4.5
1451	8	132	0.912	-12.6
1470	5	132	0.959	-7.9
1471	10	132	0.979	-7
1473	13	132	0.972	-1.2
1501	3	132	0.96	-5.4
1503	7	132	0.986	-6
1512	6	132	0.977	-6.5
1514	7	132	0.949	-9.4
1515	10	132	0.977	-6.5
1522	3	132	0.962	-6.7
1525	5	132	0.956	-7.5
1527	7	132	0.959	-9.5
1528	10	132	0.948	-12.8
1540	11	132	0.986	-0.7
1542	9	132	0.981	-4.8
1552	10	132	1.005	-8
1553	2	132	0.945	-6.8
1557	1	132	0.947	-7.7
1559	6	132	0.952	-6.8
1561	12	132	0.995	1
1562	12	132	0.997	2

1563	11	132	0.99	0.7
1564	11	132	0.986	0.8
1565	11	132	0.986	0.6
1566	11	132	0.986	0.8
1567	11	132	0.989	0.6
1568	12	132	0.993	2.5
1569	12	132	0.999	3.1
1573	6	132	0.958	-8.5
1576	9	132	0.953	-8.9
1577	5	132	0.937	-11
1578	7	132	0.988	-6.5
1579	4	132	0.941	-7
1580	8	132	0.957	-8.6
1581	9	132	0.949	-8.3
1585	12	132	0.981	-1.1
1586	12	132	0.999	0.2
1588	12	132	0.993	-0.5
1589	7	132	0.935	-10.5
1592	7	132	0.968	-6.6
1593	3	132	0.958	-5.5

LINE REPORT FOR 2019 STUDY

LINE ID	Bus From	Bus To	kV Nominal	Length	P [MW]	Q [MVAR]	S [MVA]	Loading %	Loading(Emer) %
1006_1356_1	1006	1356	132	25	-13	-33	36	55.5	41.3
1009_1088_1	1009	1088	132	148	-24	-5	24	37	27.5
1009_1088_2	1009	1088	132	148	-24	-5	24	37	27.5
1009_1148_1	1009	1148	132	97	24	5	24	37	27.5
1009_1148_2	1009	1148	132	97	24	5	24	37	27.5
1047_1048_1	1047	1048	132	37	17	2	17	26.2	19.5
1047_1052_1	1047	1052	132	98	-17	-2	17	26.2	19.5
1049_1148_1	1049	1148	132	53	-41	-8	42	66.3	49.3
1050_1096_1	1050	1096	132	7	-36	-72	80	121.6	90.5
1096_1385_1	1096	1385	132	2	-36	-52	64	95.6	71.1
1101_1105_1	1101	1105	132	24	0	-1	1	1.6	1.2
1117_1309_1	1117	1309	132	19	8	11	14	21	15.6
1117_1375_1	1117	1375	132	24	-8	-11	14	21	15.6
1148_1197_1	1148	1197	132	41	6	4	7	10.7	8
1190_1375_1	1190	1375	132	13	-11	-15	19	28.9	21.5
1356_1382_1	1356	1382	132	1	-13	-33	35	53.8	40
201_287_1	201	287	220	22	-97	-40	105	59.9	34.9
201_287_2	201	287	220	22	-97	-40	105	59.9	34.9
202_232_1	202	232	220	54	-69	-23	73	42.1	24.6
202_605_2	202	605	220	25	-22	-32	39	22.2	13
202_665_1	202	665	220	45	-28	-7	29	16.7	9.7
202_665_2	202	665	220	45	-28	-7	29	16.7	9.7
203_218_1	203	218	220	107	51	-26	57	32.5	19
203_232_1	203	232	220	12	-6	-7	10	5.5	3.2
203_266_1	203	266	220	8	-90	-60	109	61.6	35.9
203_274_1	203	274	220	63	43	-5	43	24.4	14.2
203_277_1	203	277	220	12	48	22	53	30.2	17.6
203_277_2	203	277	220	26	22	10	24	13.7	8
203_298_1	203	298	220	3	-110	4	110	62.6	36.5
203_298_2	203	298	220	3	-110	4	110	62.6	36.5

203_303_1	203	303	220	36	-59	13	61	34.4	20
203_329_1	203	329	220	70	18	-2	18	10.3	6
204_206_1	204	206	220	14	-194	-71	206	117.9	68.8
204_242_1	204	242	220	30	32	-17	36	20.6	12
206_243_1	206	243	220	56	89	11	89	50.4	29.4
206_249_1	206	249	220	132	62	-6	63	35.3	20.6
206_256_1	206	256	220	55	-175	2	175	98.6	57.5
206_256_2	206	256	220	55	-175	2	175	98.6	57.5
206_256_3	206	256	220	60	-80	3	80	45	26.3
206_256_4	206	256	220	60	-80	3	80	45	26.3
206_709_1	206	709	220	67	110	-24	113	63.4	37
207_318_1	207	318	220	43	-80	18	82	46.3	27
207_318_2	207	318	220	43	-80	18	82	46.3	27
207_6004_1	207	6004	220	0	73	26	78	43.6	25.4
207_776_1	207	776	220	70	-74	11	75	42.3	24.6
208_218_1	208	218	220	18	106	-15	107	60.1	35.1
208_231_1	208	231	220	27	-91	15	92	51.8	30.2
209_235_1	209	235	220	18	-147	5	147	82.7	48.2
209_262_1	209	262	220	6	-6	-16	17	9.8	5.7
209_262_2	209	262	220	9	-5	-13	14	7.9	4.6
209_262_3	209	262	220	9	-5	-13	14	7.9	4.6
211_235_1	211	235	220	24	-81	-28	86	48.5	28.3
211_235_2	211	235	220	24	-82	-29	87	49.1	28.6
212_238_1	212	238	220	5	-85	-5	85	48.2	28.1
212_238_2	212	238	220	5	-85	-5	85	48.2	28.1
212_704_1	212	704	220	40	98	-34	103	58.3	34
213_330_1	213	330	220	90	82	19	84	49.4	28.8
213_330_2	213	330	220	90	82	19	84	49.4	28.8
213_724_1	213	724	220	40	-51	-16	54	31.6	18.4
213_724_2	213	724	220	40	-51	-16	54	31.6	18.4
214_234_2	214	234	220	0	-141	-28	144	81.7	47.7
214_246_1	214	246	220	45	41	8	41	23.5	13.7
214_615_1	214	615	220	7	-62	-12	63	35.9	20.9
216_235_1	216	235	220	6	4	-16	17	9.3	5.4

216_235_2	216	235	220	6	4	-16	17	9.3	5.4
216_276_1	216	276	220	60	91	-16	92	51.8	30.2
216_276_2	216	276	220	60	91	-16	92	51.8	30.2
216_290_1	216	290	220	0	-137	9	138	77.3	45.1
216_290_2	216	290	220	0	-137	9	138	77.3	45.1
218_7009_1	218	7009	220	0	0	0	0	0.3	0.2
218_7030_1	218	7030	220	0	80	-2	80	44.9	26.2
218_7031_1	218	7031	220	0	220	-31	222	124.8	72.9
221_317_1	221	317	220	14	-126	-37	131	75	43.7
221_317_2	221	317	220	14	-126	-37	131	75	43.7
221_317_3	221	317	220	14	-126	-37	131	75	43.7
221_377_1	221	377	220	50	56	7	56	32	18.7
221_377_2	221	377	220	50	56	7	56	32	18.7
221_801_1	221	801	220	45	87	28	92	52.3	30.5
223_254_1	223	254	220	33	-81	-49	95	55.6	32.5
223_254_2	223	254	220	33	-81	-49	95	55.6	32.4
227_317_1	227	317	220	60	-52	24	57	31.9	18.6
227_317_2	227	317	220	60	-52	24	57	31.9	18.6
227_317_3	227	317	220	60	-52	24	57	31.9	18.6
227_6005_1	227	6005	220	0	34	-96	102	57.2	33.4
227_606_1	227	606	220	30	18	21	27	15.4	9
227_606_2	227	606	220	30	18	21	27	15.4	9
229_230_1	229	230	220	1	16	-10	19	10.7	6.2
229_230_2	229	230	220	1	16	-10	19	10.7	6.2
229_242_1	229	242	220	161	-14	1	14	7.8	4.5
229_251_1	229	251	220	105	-33	13	35	19.7	11.5
229_251_2	229	251	220	105	-33	13	35	19.7	11.5
229_254_1	229	254	220	116	35	12	37	21	12.2
229_305_1	229	305	220	74	70	6	71	39.7	23.1
229_7036_1	229	7036	220	0	43	-29	52	29.2	17
229_7038_1	229	7038	220	0	38	-28	47	26.6	15.6
230_645_1	230	645	220	36	-56	10	57	31.9	18.6
230_7034_1	230	7034	220	0	83	-7	84	47	27.5
230_7034_2	230	7034	220	0	83	-7	84	47	27.5

230_7034_3	230	7034	220	0	83	-7	84	47	27.5
230_7037_1	230	7037	220	0	90	-8	90	50.8	29.7
230_758_1	230	758	220	50	-15	12	19	10.6	6.2
230_758_2	230	758	220	50	-15	12	19	10.6	6.2
231_246_1	231	246	220	123	-16	13	21	11.7	6.8
233_234_1	233	234	220	6	-88	-10	88	29.1	13
233_234_2	233	234	220	6	-88	-10	88	29.1	13
233_6001_1	233	6001	220	0	-50	-40	64	36.3	21.2
234_246_1	234	246	220	42	74	15	75	42.6	24.8
234_246_2	234	246	220	2	74	15	75	42.6	24.9
234_297_1	234	297	220	4	-150	-9	150	49.6	22.1
234_297_2	234	297	220	4	-150	-9	150	49.6	22.1
234_304_2	234	304	220	6	146	30	149	84.3	49.2
234_615_1	234	615	220	7	85	22	87	49.5	28.8
234_662_1	234	662	220	60	63	-11	64	36.1	21
234_766_1	234	766	220	25	4	-25	25	14.4	8.4
234_766_2	234	766	220	25	5	-27	28	15.7	9.1
235_262_1	235	262	220	16	161	-6	161	90.4	52.7
235_276_1	235	276	220	64	85	-13	86	48.3	28.2
235_276_2	235	276	220	70	78	-13	79	44.2	25.8
235_338_1	235	338	220	12	133	37	138	77.5	45.2
235_380_1	235	380	220	70	69	11	70	39.2	22.8
235_645_1	235	645	220	84	43	-9	44	24.9	14.5
235_758_1	235	758	220	85	58	-5	58	32.4	18.9
235_758_2	235	758	220	85	58	-5	58	32.4	18.9
235_769_1	235	769	220	55	42	36	56	31.1	18.1
235_799_1	235	799	220	15	107	30	111	62.4	36.4
238_258_1	238	258	220	57	-64	2	64	36.2	21.1
238_278_1	238	278	220	42	23	5	23	13.1	7.6
238_324_1	238	324	220	57	-18	0	18	10	5.8
238_657_1	238	657	220	40	94	1	94	53	30.9
238_657_2	238	657	220	40	94	1	94	53	30.9
238_788_1	238	788	220	130	-14	-12	18	10.3	6
243_264_1	243	264	220	54	43	-8	44	25	14.6

244_368_1	244	368	220	90	26	2	26	14.4	8.4
244_368_2	244	368	220	90	26	2	26	14.4	8.4
244_788_1	244	788	220	20	4	-2	4	2.2	1.3
244_788_2	244	788	220	20	4	-2	4	2.2	1.3
246_326_1	246	326	220	18	-23	-3	23	13.3	7.8
246_326_2	246	326	220	18	-23	-3	23	13.3	7.8
246_763_1	246	763	220	0	19	2	20	11.2	6.5
246_763_2	246	763	220	15	19	2	20	11.2	6.5
249_264_1	249	264	220	34	-25	6	26	14.6	8.5
249_317_2	249	317	220	85	-46	-8	47	26.8	15.6
249_367_1	249	367	220	40	65	-16	67	38.3	22.3
249_646_1	249	646	220	24	-56	-36	67	38.2	22.3
249_646_2	249	646	220	24	-56	-36	67	38.2	22.3
249_787_1	249	787	220	10	18	7	19	11.1	6.5
251_261_1	251	261	220	35	81	28	86	48.9	28.5
251_261_2	251	261	220	35	81	28	86	48.9	28.5
251_287_1	251	287	220	21	-59	-8	59	33.6	19.6
251_287_2	251	287	220	21	-59	-8	59	33.6	19.6
251_657_1	251	657	220	40	-56	5	56	31.8	18.6
251_657_2	251	657	220	40	-56	5	56	31.8	18.6
254_305_1	254	305	220	67	15	-26	30	17.2	10
254_377_1	254	377	220	120	-13	-9	16	9.1	5.3
254_377_2	254	377	220	120	-13	-9	16	9.1	5.3
254_380_1	254	380	220	90	-37	-14	39	22.6	13.2
256_257_1	256	257	220	16	54	27	60	33.9	19.8
256_257_2	256	257	220	16	54	27	60	33.9	19.8
256_399_1	256	399	220	40	59	12	60	33.9	19.8
256_399_2	256	399	220	40	59	12	60	33.9	19.8
256_687_1	256	687	220	40	8	7	11	6.2	3.6
256_687_2	256	687	220	40	8	7	11	6.2	3.6
256_771_1	256	771	220	13	5	-50	50	28.2	16.5
256_771_2	256	771	220	13	5	-50	50	28.2	16.5
258_263_1	258	263	220	63	28	-12	30	17	9.9
258_301_1	258	301	220	61	-59	-9	60	33.8	19.7

258_301_2	258	301	220	61	-59	-9	60	33.8	19.7
258_687_1	258	687	220	60	30	-7	31	17.5	10.2
258_687_2	258	687	220	60	30	-7	31	17.5	10.2
260_244_1	260	244	220	20	110	12	111	36.2	16.1
260_244_2	260	244	220	20	110	12	111	36.2	16.1
260_778_1	260	778	220	50	-19	6	20	11.3	6.6
260_778_2	260	778	220	50	-19	6	20	11.3	6.6
260_779_1	260	779	220	70	-63	1	63	20.7	9.2
260_779_2	260	779	220	70	-63	1	63	20.7	9.2
260_779_3	260	779	220	70	-43	5	44	24.4	14.2
260_779_4	260	779	220	70	-43	5	44	24.4	14.2
262_387_1	262	387	220	3	42	22	48	26.9	15.7
262_387_2	262	387	220	3	42	22	48	26.9	15.7
262_605_1	262	605	220	65	48	21	53	29.5	17.2
262_605_2	262	605	220	65	48	21	53	29.5	17.2
262_7032_1	262	7032	220	0	180	-141	229	128.4	75
262_806_1	262	806	220	50	36	0	36	20.2	11.8
262_806_2	262	806	220	50	36	0	36	20.2	11.8
266_282_1	266	282	220	24	76	36	84	47.2	27.5
267_274_1	267	274	220	10	81	41	90	51.3	29.9
267_274_2	267	274	220	10	81	41	90	51.3	29.9
274_333_1	274	333	220	55	38	14	41	23.3	13.6
274_333_2	274	333	220	55	38	14	41	23.3	13.6
276_7018_1	276	7018	220	0	90	-63	110	61.8	36
276_7018_2	276	7018	220	0	90	-63	110	61.8	36
277_282_1	277	282	220	6	114	34	119	67.7	39.5
277_282_2	277	282	220	6	114	34	119	67.7	39.5
277_335_1	277	335	220	89	-25	6	25	14.4	8.4
282_665_1	282	665	220	20	71	23	74	42.3	24.7
282_665_2	282	665	220	20	71	23	74	42.3	24.7
287_623_1	287	623	220	18	95	-69	117	66.3	38.7
293_794_1	293	794	220	35	-43	-22	49	27.8	16.2
293_794_2	293	794	220	35	-43	-22	49	27.8	16.2
293_805_1	293	805	220	60	-17	-6	18	10.5	6.1

293_805_2	293	805	220	60	-17	-6	18	10.5	6.1
297_326_1	297	326	220	60	50	8	51	28.8	16.8
297_326_2	297	326	220	60	50	8	51	28.8	16.8
297_643_1	297	643	220	30	89	12	90	51	29.8
297_643_2	297	643	220	30	89	12	90	51	29.8
298_303_1	298	303	220	40	-43	9	44	25	14.6
298_303_2	298	303	220	32	-43	9	44	25.1	14.6
298_333_1	298	333	220	56	92	15	93	53	30.9
298_798_1	298	798	220	50	140	46	147	83.4	48.6
303_307_1	303	307	220	3	-85	-8	85	48.5	28.3
303_307_2	303	307	220	3	-85	-8	85	48.5	28.3
303_662_1	303	662	220	98	15	-11	18	10.5	6.1
303_800_1	303	800	220	60	26	22	34	19.4	11.3
303_800_2	303	800	220	60	26	22	34	19.4	11.3
304_662_1	304	662	220	48	61	-16	63	35.9	20.9
317_656_1	317	656	220	85	35	-10	36	20.5	12
317_656_2	317	656	220	85	35	-10	36	20.5	12
317_691_1	317	691	220	20	50	21	54	30.7	17.9
318_341_1	318	341	220	60	54	7	54	30.3	17.7
318_341_2	318	341	220	60	54	7	54	30.3	17.7
318_367_1	318	367	220	55	-11	32	34	19.1	11.1
324_325_1	324	325	220	19	-36	5	36	20.4	11.9
324_331_1	324	331	220	37	18	3	18	10.3	6
333_327_1	333	327	220	64	18	7	20	11.4	6.6
338_230_1	338	230	220	110	37	-18	41	23.3	13.6
341_668_1	341	668	220	75	39	12	41	23.2	13.6
341_668_2	341	668	220	75	39	12	41	23.2	13.6
341_710_1	341	710	220	58	-56	-12	57	32.6	19
368_399_1	368	399	220	35	-13	-5	14	8	4.6
368_399_2	368	399	220	35	-13	-5	14	8	4.6
380_381_1	380	381	220	8	-27	-16	31	17.5	10.2
380_381_2	380	381	220	8	-27	-16	31	17.5	10.2
381_667_1	381	667	220	28	88	23	91	51.7	30.2
381_667_2	381	667	220	28	88	23	91	51.7	30.2

381_807_1	381	807	220	35	48	4	48	27.1	15.8
381_807_2	381	807	220	35	48	4	48	27.1	15.8
399_396_1	399	396	220	55	4	-6	7	3.9	2.3
399_396_2	399	396	220	55	4	-6	7	3.9	2.3
401_404_1	401	404	400	282	68	-83	107	19.3	8.6
401_404_2	401	404	400	282	68	-83	107	19.3	8.6
401_421_1	401	421	400	173	115	-56	128	23.1	10.3
401_7005_1	401	7005	400	0	404	468	619	111.4	49.6
404_7025_1	404	7025	400	0	13	24	27	4.8	2.2
404_7026_1	404	7026	400	0	-372	60	376	67.8	30.2
404_7026_2	404	7026	400	0	-372	60	376	67.8	30.2
404_7027_1	404	7027	400	0	333	-6	333	60.1	26.7
404_7027_2	404	7027	400	0	333	-6	333	60.1	26.7
404_7027_3	404	7027	400	0	333	-6	333	60.1	26.7
404_7028-1	404	7028	400	0	-39	28	48	8.7	3.9
405_410_1	405	410	400	95	-171	-7	171	30.9	13.7
405_564_1	405	564	400	290	-56	-111	124	11.2	5.6
405_564_2	405	564	400	290	-56	-111	124	11.2	5.6
405_7003_1	405	7003	400	0	868	-20	868	156.5	69.6
405_7004_1	405	7004	400	0	710	-6	710	127.9	56.9
405_7011_1	405	7011	400	0	-593	124	605	54.6	27.3
405_7011_2	405	7011	400	0	-593	124	605	54.6	27.3
406_407_3	406	407	400	313	-75	-79	109	19.6	8.7
406_419_1	406	419	400	140	-85	-59	104	18.7	8.3
406_419_2	406	419	400	140	-85	-59	104	18.7	8.3
406_422_1	406	422	400	290	-48	-75	89	16	7.1
406_422_2	406	422	400	290	-48	-75	89	16	7.1
406_427_2	406	427	400	25	289	-30	291	52.4	23.3
406_529_1	406	529	400	320	-47	-92	103	18.6	8.3
406_7029_1	406	7029	400	0	110	465	478	86.2	38.3
407_412_1	407	412	400	3	37	-9	38	6.9	3.1
407_412_2	407	412	400	3	37	-9	38	6.9	3.1
407_415_1	407	415	400	5	-208	-84	224	40.4	18
407_415_2	407	415	400	5	-208	-84	224	40.4	18

407_7008_1	407	7008	400	0	-100	102	143	25.7	11.5
407_7008_2	407	7008	400	0	-100	102	143	25.7	11.5
410_7020_1	410	7020	400	0	-172	312	356	64.2	28.6
410_7024_1	410	7024	400	0	33	293	295	53.1	23.6
412_414_1	412	414	400	3	-278	-69	286	51.6	23
412_414_2	412	414	400	3	-278	-69	286	51.6	23
412_414_3	412	414	400	3	-278	-69	286	51.6	23
412_414_4	412	414	400	3	-278	-69	286	51.6	23
412_416_1	412	416	400	167	68	-72	99	17.8	7.9
412_416_2	412	416	400	167	68	-72	99	17.8	7.9
412_552_1	412	552	400	113	250	13	251	22.6	11.3
412_552_2	412	552	400	113	250	13	251	22.6	11.3
412_7022_1	412	7022	400	0	225	177	286	51.5	22.9
412_7022_2	412	7022	400	0	225	177	286	51.5	22.9
414_415_1	414	415	400	2	-82	-67	106	19.1	8.5
414_415_2	414	415	400	2	-82	-67	106	19.1	8.5
415_419_1	415	419	400	170	78	-76	109	19.7	8.8
415_419_2	415	419	400	170	78	-76	109	19.7	8.8
416_417_1	416	417	400	2	-100	33	105	18.8	8.4
416_417_2	416	417	400	2	-100	33	105	18.8	8.4
416_511_1	416	511	400	100	51	0	51	9.1	4
416_511_2	416	511	400	100	51	0	51	9.1	4
416_561_1	416	561	400	120	252	-47	256	45.9	20.4
416_561_2	416	561	400	120	252	-47	256	45.9	20.4
419_416_1	419	416	400	5	-7	48	48	4.3	2.2
419_416_2	419	416	400	5	-7	48	48	4.3	2.2
421_518_1	421	518	400	90	-275	-27	277	25	12.5
421_518_2	421	518	400	90	-275	-27	277	25	12.5
421_7006_1	421	7006	400	0	160	103	190	34.3	15.2
421_7017_1	421	7017	400	0	450	76	456	82.2	36.6
422_529_1	422	529	400	5	-40	-49	63	11.4	5.1
422_529_2	422	529	400	5	-40	-49	63	11.4	5.1
422_7010_1	422	7010	400	0	470	165	498	89.8	40
422_7010_2	422	7010	400	0	470	165	498	89.8	40

422_7019_1	422	7019	400	0	510	162	535	96.4	42.9
422_7019_2	422	7019	400	0	510	162	535	96.4	42.9
427_432_1	427	432	400	60	118	-28	121	21.8	9.7
427_432_2	427	432	400	60	118	-28	121	21.8	9.7
427_568_1	427	568	400	15	177	-24	179	16.1	8.1
427_568_2	427	568	400	15	177	-24	179	16.1	8.1
427_7023_1	427	7023	400	0	80	83	115	20.7	9.2
427_7023_2	427	7023	400	0	80	83	115	20.7	9.2
432_517_1	432	517	400	110	114	-14	115	20.7	9.2
432_517_2	432	517	400	110	114	-14	115	20.7	9.2
432_7021_1	432	7021	400	0	-70	55	89	16.1	7.2
432_7021_2	432	7021	400	0	-70	55	89	16.1	7.2
441_553_1	441	553	400	130	-176	8	176	15.8	7.9
441_553_2	441	553	400	130	-176	8	176	15.8	7.9
481_416_1	481	416	400	39	150	-32	153	27.5	12.2
481_416_2	481	416	400	39	150	-32	153	27.5	12.2
482_416_1	482	416	400	26	85	-29	90	16.1	7.2
482_416_2	482	416	400	26	85	-29	90	16.1	7.2
490_416_1	490	416	400	7	90	-13	91	16.3	7.2
490_416_2	490	416	400	7	90	-13	91	16.3	7.2
511_7041_1	511	7041	400	0	50	154	162	14.6	7.3
515_518_1	515	518	400	120	410	-53	413	37.2	18.6
515_518_2	515	518	400	120	410	-53	413	37.2	18.6
515_529_1	515	529	400	36	492	-7	492	44.3	22.1
515_529_2	515	529	400	36	492	-7	492	44.3	22.1
519_554_1	519	554	400	135	225	-46	229	40.9	18.2
519_554_2	519	554	400	135	225	-46	229	40.9	18.2
529_427_1	529	427	400	330	69	-104	124	22.4	10
535_511_1	535	511	400	85	90	-24	93	16.7	7.4
535_511_2	535	511	400	85	90	-24	93	16.7	7.4
541_564_1	541	564	400	5	614	-59	617	55.4	27.7
542_404_1	542	404	400	190	284	-60	291	52.3	23.3
542_405_1	542	405	400	100	166	-34	170	30.5	13.6
542_410_1	542	410	400	5	68	145	160	14.4	7.2

542_410_2	542	410	400	5	68	145	160	14.4	7.2
542_564_1	542	564	400	300	18	-117	118	10.7	5.3
542_564_2	542	564	400	300	18	-117	118	10.7	5.3
547_406_1	547	406	400	20	150	-8	150	27	12
547_406_2	547	406	400	20	150	-8	150	27	12
553_572_	553	572	400	103	15	-76	78	7	3.5
553_572_2	553	572	400	103	15	-76	78	7	3.5
553_573_1	553	573	400	25	-175	-11	175	15.8	7.9
553_573_2	553	573	400	25	-175	-11	175	15.8	7.9
553_7042_1	553	7042	400	0	50	196	202	18.2	9.1
553_7042_2	553	7042	400	0	50	196	202	18.2	9.1
554_421_1	554	421	400	80	101	5	101	18.2	8.1
554_421_2	554	421	400	80	101	5	101	18.2	8.1
555_410_3	555	410	400	120	57	-16	59	5.3	2.7
555_410_4	555	410	400	120	57	-16	59	5.3	2.7
555_574_1	555	574	400	10	-100	10	101	9	4.5
555_574_2	555	574	400	10	-100	10	101	9	4.5
556_412_1	556	412	400	5	240	29	242	21.8	10.9
556_412_2	556	412	400	5	240	29	242	21.8	10.9
556_575_1	556	575	400	125	145	-42	151	27.2	12.1
556_575_2	556	575	400	125	145	-42	151	27.2	12.1
558_410_1	558	410	400	40	-33	-5	33	3	1.5
558_410_2	558	410	400	40	-33	-5	33	3	1.5
559_401_1	559	401	400	80	157	10	158	14.1	7.1
559_401_2	559	401	400	80	157	10	158	14.1	7.1
559_401_3	559	401	400	80	157	10	158	14.1	7.1
559_401_4	559	401	400	80	157	10	158	14.1	7.1
559_441_1	559	441	400	105	-191	-41	196	17.6	8.8
559_441_2	559	441	400	105	-191	-41	196	17.6	8.8
561_432_1	561	432	400	160	-20	-29	35	6.3	2.8
561_432_2	561	432	400	160	-20	-29	35	6.3	2.8
561_562_1	561	562	400	40	159	-18	160	14.4	7.2
561_562_2	561	562	400	40	159	-18	160	14.4	7.2
562_545_1	562	545	400	103	72	-26	77	6.9	3.4

562_545_2	562	545	400	103	72	-26	77	6.9	3.4
563_410_1	563	410	400	40	114	32	118	10.6	5.3
563_410_2	563	410	400	32	142	47	150	13.5	6.7
563_555_1	563	555	400	90	-26	-50	56	5.1	2.5
563_555_2	563	555	400	75	-31	-48	57	5.1	2.6
564_422_1	564	422	400	10	989	202	1009	90.7	45.3
564_422_2	564	422	400	10	989	202	1009	90.7	45.3
565_564_1	565	564	400	5	610	-58	613	55.1	27.5
566_564_1	566	564	400	5	270	-157	312	28.1	14
566_567_1	566	567	400	5	0	-14	14	1.3	0.6
567_564_1	567	564	400	5	270	-144	306	27.5	13.8
568_432_1	568	432	400	55	109	-23	111	10	5
568_432_2	568	432	400	55	109	-23	111	10	5
569_564_1	569	564	400	5	145	200	247	22.1	11.1
569_564_2	569	564	400	5	145	200	247	22.1	11.1
572_555_1	572	555	400	29	65	-12	66	6	3
572_555_2	572	555	400	29	65	-12	66	6	3
575_511_1	575	511	400	120	-1	-41	41	7.4	3.3
575_511_2	575	511	400	120	-1	-41	41	7.4	3.3
605_202_1	605	202	220	35	15	17	23	12.9	7.5
622_254_1	622	254	220	15	15	1	15	8.7	5.1
622_254_2	622	254	220	15	15	1	15	8.7	5.1
622_254_3	622	254	220	10	23	3	23	13.3	7.8
622_254_4	622	254	220	10	23	3	23	13.3	7.8
622_340_1	622	340	220	65	-6	-6	8	4.8	2.8
622_340_2	622	340	220	65	-6	-6	8	4.8	2.8
622_392_1	622	392	220	48	82	45	93	53.7	31.3
622_392_2	622	392	220	48	82	45	93	53.7	31.3
623_639_1	623	639	220	10	32	12	35	19.4	11.3
623_7039_1	623	7039	220	0	47	-88	100	56.1	32.7
624_634_1	624	634	220	10	-15	-7	17	9.5	5.5
634_657_1	634	657	220	11	-30	-13	33	18.6	10.9
635_636_1	635	636	220	9	30	12	32	18.4	10.7
635_657_1	635	657	220	12	-45	-19	49	27.9	16.3

636_637_1	636	637	220	7	15	6	16	9.2	5.4
639_756_1	639	756	220	13	7	2	7	4.2	2.4
642_335_1	642	335	220	15	27	9	28	16	9.3
642_335_2	642	335	220	5	80	31	86	49	28.6
642_335_3	642	335	220	5	80	31	86	49	28.6
642_769_3	642	769	220	48	43	-1	43	24.5	14.3
643_764_1	643	764	220	10	5	-29	29	16.5	9.6
643_764_2	643	764	220	10	5	-29	29	16.5	9.6
643_817_1	643	817	220	8	42	23	48	27.3	15.9
643_817_2	643	817	220	8	42	23	48	27.3	15.9
646_606_1	646	606	220	50	18	-13	22	12.6	7.3
646_606_2	646	606	220	50	18	-13	22	12.6	7.3
646_656_1	646	656	220	5	-8	12	14	7.9	4.6
646_656_2	646	656	220	5	-8	12	14	7.9	4.6
646_770_1	646	770	220	55	23	-26	35	19.7	11.5
646_770_2	646	770	220	55	23	-26	35	19.7	11.5
646_797_1	646	797	220	40	42	19	46	26.3	15.4
646_797_2	646	797	220	40	42	19	46	26.3	15.4
662_274_1	662	274	220	95	35	-8	36	20.6	12
662_765_1	662	765	220	10	9	-27	28	15.9	9.3
662_765_2	662	765	220	10	9	-27	28	15.9	9.3
667_810_1	667	810	220	60	43	17	46	26.2	15.3
667_810_2	667	810	220	60	43	17	46	26.2	15.3
686_687_1	686	687	220	8	-23	-12	25	14.3	8.4
686_687_2	686	687	220	8	-23	-12	25	14.3	8.4
687_688_1	687	688	220	8	14	3	14	7.8	4.6
687_688_2	687	688	220	8	14	3	14	7.8	4.6
688_689_1	688	689	220	5	11	3	12	6.6	3.9
688_689_2	688	689	220	5	11	3	12	6.6	3.9
689_690_1	689	690	220	9	9	3	9	5.3	3.1
689_690_2	689	690	220	9	9	3	9	5.3	3.1
691_692_1	691	692	220	7	28	12	30	17.2	10
704_6002_1	704	6002	220	0	72	-13	73	41.1	23.9
705_645_1	705	645	220	8	40	-1	40	22.5	13.1

709_239_1	709	239	220	16	86	-4	86	48.4	28.2
762_303_1	762	303	220	35	64	6	64	36.3	21.2
762_303_2	762	303	220	35	64	6	64	36.3	21.2
763_774_1	763	774	220	98	10	0	10	6	3.5
763_774_2	763	774	220	98	10	0	10	6	3.5
774_213_1	774	213	220	40	102	32	106	61.4	35.8
774_213_2	774	213	220	40	102	32	106	61.4	35.8
774_246_1	774	246	220	60	-23	-17	29	16.6	9.7
774_246_2	774	246	220	60	-23	-17	29	16.6	9.7
774_723_1	774	723	220	25	75	25	79	45.4	26.5
774_723_2	774	723	220	25	75	25	79	45.4	26.5
774_724_1	774	724	220	20	108	41	115	66.5	38.8
774_724_2	774	724	220	20	108	41	115	66.5	38.8
775_785_1	775	785	220	13	75	1	75	24.6	11
775_785_2	775	785	220	13	75	1	75	24.6	11
775_786_1	775	786	220	55	2	-10	11	5.9	3.4
775_786_2	775	786	220	55	2	-10	11	5.9	3.4
775_786_3	775	786	220	55	4	-14	15	4.9	2.2
775_786_4	775	786	220	55	4	-14	15	4.9	2.2
776_239_1	776	239	220	10	24	19	31	17.2	10
776_239_2	776	239	220	10	24	19	31	17.2	10
776_239_3	776	239	220	8	28	22	35	19.9	11.6
776_710_1	776	710	220	40	46	-8	47	26.5	15.5
776_710_2	776	710	220	40	46	-8	47	26.5	15.5
777_325_1	777	325	220	40	60	0	60	34	19.8
777_325_2	777	325	220	40	60	0	60	34	19.8
777_780_1	777	780	220	17	14	10	17	9.6	5.6
777_780_2	777	780	220	17	14	10	17	9.6	5.6
777_781_1	777	781	220	68	-9	2	10	5.4	3.2
777_781_2	777	781	220	68	-9	2	10	5.4	3.2
777_782_1	777	782	220	70	-3	1	3	1.5	0.8
777_782_2	777	782	220	70	-3	1	3	1.5	0.8
777_783_1	777	783	220	75	-9	1	10	5.3	3.1
777_783_2	777	783	220	75	-9	1	10	5.3	3.1

777_784_1	777	784	220	10	27	12	30	16.7	9.7
777_784_2	777	784	220	10	27	12	30	16.7	9.7
780_357_1	780	357	220	84	26	2	26	14.5	8.5
780_357_2	780	357	220	84	26	2	26	14.5	8.5
785_258_1	785	258	220	60	98	-5	98	32.2	14.3
785_258_2	785	258	220	60	98	-5	98	32.2	14.3
786_301_1	786	301	220	15	102	-32	107	34.8	15.5
786_301_2	786	301	220	15	102	-32	107	34.8	15.5
788_263_1	788	263	220	15	-11	10	15	8.4	4.9
788_789_1	788	789	220	7	2	0	2	1.3	0.7
788_789_2	788	789	220	7	2	0	2	1.3	0.7
788_790_1	788	790	220	10	0	-1	1	0.8	0.5
791_238_1	791	238	220	35	115	-9	116	65.2	38
791_238_2	791	238	220	35	115	-9	116	65.2	38
791_607_1	791	607	220	20	42	20	47	26.4	15.4
791_607_2	791	607	220	20	42	20	47	26.4	15.4
792_793_1	792	793	220	40	27	7	28	9.1	4
792_793_2	792	793	220	40	27	7	28	9.1	4
798_327_1	798	327	220	35	-19	-18	26	15.2	8.9
799_254_1	799	254	220	145	44	1	44	25	14.6
799_811_1	799	811	220	6	57	8	57	32.2	18.8
799_811_2	799	811	220	6	28	8	29	16.4	9.6
800_663_1	800	663	220	5	100	48	111	64.2	37.5
800_663_2	800	663	220	5	100	48	111	64.2	37.5
801_223_1	801	223	220	90	33	2	33	19.1	11.2
805_327_1	805	327	220	35	82	40	91	52.1	30.4
805_327_2	805	327	220	35	82	40	91	52.1	30.4
805_605_1	805	605	220	15	13	15	20	6.5	2.9
805_605_2	805	605	220	15	13	15	20	6.5	2.9
806_768_1	806	768	220	50	37	8	38	21.4	12.5
806_768_2	806	768	220	50	37	8	38	21.4	12.5
806_794_1	806	794	220	30	86	35	93	52.5	30.6
806_794_2	806	794	220	30	86	35	93	52.5	30.6
807_340_1	807	340	220	25	52	20	56	31.7	18.5

807_340_2	807	340	220	25	52	20	56	31.7	18.5
807_667_1	807	667	220	30	25	13	28	16.2	9.5
807_667_2	807	667	220	30	25	13	28	16.2	9.5
807_734_1	807	734	220	25	42	21	47	26.9	15.7
807_734_2	807	734	220	25	42	21	47	26.9	15.7
816_338_1	816	338	220	7	15	6	16	9.2	5.4
816_338_2	816	338	220	7	15	6	16	9.2	5.4
816_799_1	816	799	220	3	53	1	53	30	17.5
816_799_2	816	799	220	3	53	1	53	30	17.5
951_7015_1	951	7015	765	0	####	56	1758	78.1	41.3
951_7016_1	951	7016	765	0	845	-27	845	37.6	19.8
954_951_1	954	951	765	300	-145	-205	251	10.9	5.8
954_951_2	954	951	765	300	-145	-205	251	10.9	5.8

TRANSFORMER REPORT FOR STUDY 2019

TRS ID	Bus From	Bus To	kV Nominal Primary	kV Nominal Secondary	P [MW]	Q [MVAR]	S [MVA]	Capacity (Norm.) [MVA]	Loading [%] Capacity	Capacity (Emer.) [MVA]	Loading [%] Capacity
201_1007_1	201	1007	220	132	59.27	24.45	64.1	60	106.9	100	64.1
201_1007_2	**201**	**1007**	**220**	**132**	**75.86**	**31.3**	**82.1**	**96**	**85.5**	**160**	**51.3**
201_1007_3	201	1007	220	132	59.27	24.45	64.1	60	106.9	100	64.1
202_1018_1	202	1018	220	132	54	30.18	61.9	60	103.1	100	61.9
202_1018_2	202	1018	220	132	54	30.18	61.9	60	103.1	100	61.9
202_1018_3	202	1018	220	132	54	30.18	61.9	60	103.1	100	61.9
203_1019_1	203	1019	220	132	56.64	14.01	58.4	60	97.3	100	58.4
203_1019_2	203	1019	220	132	68.88	17.04	71	96	73.9	160	44.3
203_1019_3	203	1019	220	132	68.88	17.04	71	96	73.9	160	44.3
204_1025_1	204	1025	220	132	54	29.27	61.4	60	102.4	100	61.4
204_1025_2	204	1025	220	132	54	29.27	61.4	60	102.4	100	61.4
204_1025_3	204	1025	220	132	54	29.27	61.4	60	102.4	100	61.4
206_1346_1	206	1346	220	132	27	-47.95	55	60	91.7	100	55
207_1032_1	207	1032	220	132	54	8.79	54.7	60	91.2	100	54.7
207_1032_2	**207**	**1032**	**220**	**132**	**54**	**8.79**	**54.7**	**60**	**91.2**	**100**	**54.7**
207_1032_3	207	1032	220	132	54	8.79	54.7	60	91.2	100	54.7
209_1039_1	209	1039	220	132	54	12.81	55.5	60	92.5	100	55.5
209_1039_2	209	1039	220	132	54	12.81	55.5	60	92.5	100	55.5
209_1039_3	209	1039	220	132	54	12.81	55.5	60	92.5	100	55.5
211_1045_1	211	1045	220	132	38.06	13.33	40.3	60	67.2	100	40.3
211_1045_2	211	1045	220	132	38.06	13.33	40.3	60	67.2	100	40.3
211_1045_3	211	1045	220	132	38.06	13.33	40.3	60	67.2	100	40.3
211_1045_4	211	1045	220	132	48.72	17.06	51.6	96	53.8	160	32.3
212_1048_1	212	1048	220	132	36	21.31	41.8	60	69.7	100	41.8
212_1048_2	212	1048	220	132	36.87	21.82	42.8	96	44.6	160	26.8
213_1049_1	213	1049	220	132	42.7	18.64	46.6	60	77.6	100	46.6
213_1049_2	213	1049	220	132	42.7	18.64	46.6	60	77.6	100	46.6

213_1049_3	213	1049	220	132	54.65	23.86	59.6	96	62.1	160	37.3
214_1050_1	214	1050	220	132	45.6	9.07	46.5	60	77.5	100	46.5
214_1050_2	214	1050	220	132	58.37	11.61	59.5	96	62	160	37.2
214_1050_3	214	1050	220	132	58.37	11.61	59.5	96	62	160	37.2
216_1061_1	216	1061	220	132	42.3	22.79	48.1	60	80.1	100	48
216_1061_2	216	1061	220	132	42.3	22.79	48.1	60	80.1	100	48
221_1101_1	221	1101	220	132	54.48	20.74	58.3	60	97.2	100	58.3
221_1101_2	**221**	**1101**	**220**	**132**	**62.76**	**23.9**	**67.2**	**96**	**70**	**160**	**42**
221_1101_3	221	1101	220	132	62.76	23.9	67.2	96	70	160	42
223_1109_1	223	1109	220	132	59.27	33.79	68.2	60	113.7	100	68.2
223_1109_2	223	1109	220	132	59.27	33.79	68.2	60	113.7	100	68.2
223_1109_3	223	1109	220	132	75.86	43.25	87.3	96	91	160	54.6
227_1140_1	227	1140	220	132	42.3	-8.2	43.1	60	71.8	100	43.1
227_1140_2	227	1140	220	132	42.3	-8.2	43.1	60	71.8	100	43.1
229_1145_1	229	1145	220	132	29.54	15.42	33.3	60	55.5	100	33.3
229_1145_2	229	1145	220	132	29.54	15.42	33.3	60	55.5	100	33.3
239_1066_1	239	1066	220	132	54	19.89	57.6	60	95.9	100	57.5
239_1066_2	239	1066	220	132	54	19.89	57.6	60	95.9	100	57.5
239_1066-3	239	1066	220	132	54	19.89	57.6	60	95.9	100	57.5
243_1312_1	243	1312	220	132	27	14.03	30.4	60	50.7	100	30.4
244_1051_1	244	1051	220	132	54	9.39	54.8	60	91.4	100	54.8
244_1051_2	244	1051	220	132	54	9.39	54.8	60	91.4	100	54.8
244_1051_3	244	1051	220	132	54	9.39	54.8	60	91.4	100	54.8
246_1197_1	246	1197	220	132	39.92	20.38	44.8	60	74.7	100	44.8
246_1197_2	246	1197	220	132	51.1	26.08	57.4	96	59.8	160	35.9
246_1197_3	**246**	**1197**	**220**	**132**	**39.92**	**20.38**	**44.8**	**60**	**74.7**	**100**	**44.8**
249_1129_1	**249**	**1129**	**220**	**132**	**54**	**30.11**	**61.8**	**60**	**103**	**100**	**61.8**
249_1129_2	249	1129	220	132	54	30.11	61.8	60	103	100	61.8
249_1129_3	249	1129	220	132	54	30.11	61.8	60	103	100	61.8
254_1580_1	254	1580	220	132	27	14.3	30.6	60	50.9	100	30.6
257_1160_1	257	1160	220	132	36	19.11	40.8	60	67.9	100	40.8
257_1160_2	257	1160	220	132	36	19.11	40.8	60	67.9	100	40.8

257_1160_3	257	1160	220	132	36	19.11	40.8	60	67.9	100	40.8
258_1011_1	258	1011	220	132	54	19.85	57.5	60	95.9	100	57.5
258_1011_2	258	1011	220	132	54	19.85	57.5	60	95.9	100	57.5
258_1011_3	258	1011	220	132	54	19.85	57.5	60	95.9	100	57.5
261_1095_1	261	1095	220	132	54	20.5	57.8	60	96.3	100	57.8
261_1095_2	261	1095	220	132	54	20.5	57.8	60	96.3	100	57.8
261_1095_3	261	1095	220	132	54	20.5	57.8	60	96.3	100	57.8
274_1060_1	274	1060	220	132	54	20.21	57.7	60	96.1	100	57.7
274_1060_2	**274**	**1060**	**220**	**132**	**54**	**20.21**	**57.7**	**60**	**96.1**	**100**	**57.7**
274_1060_3	274	1060	220	132	54	20.21	57.7	60	96.1	100	57.7
276_1030_1	**276**	**1030**	**220**	**132**	**54**	**29.97**	**61.8**	**60**	**102.9**	**100**	**61.8**
276_1030_2	276	1030	220	132	54	29.97	61.8	60	102.9	100	61.8
276_1030_3	276	1030	220	132	54	29.97	61.8	60	102.9	100	61.8
282_1318_1	**282**	**1318**	**220**	**132**	**54**	**20.25**	**57.7**	**60**	**96.1**	**100**	**57.7**
282_1318_2	282	1318	220	132	54	20.25	57.7	60	96.1	100	57.7
282_1318_3	282	1318	220	132	54	20.25	57.7	60	96.1	100	57.7
293_1309_1	**293**	**1309**	**220**	**132**	**40.44**	**18.83**	**44.6**	**60**	**74.3**	**100**	**44.6**
293_1309_2	**293**	**1309**	**220**	**132**	**40.44**	**18.83**	**44.6**	**60**	**74.3**	**100**	**44.6**
293_1309_3	293	1309	220	132	40.44	18.83	44.6	60	74.3	100	44.6
301_1198_1	301	1198	220	132	42.3	-30.69	52.3	60	87.1	100	52.3
301_1198_2	301	1198	220	132	42.3	-30.69	52.3	60	87.1	100	52.3
303_1113_1	303	1113	220	132	42.3	22.85	48.1	60	80.1	100	48.1
303_1113_2	303	1113	220	132	42.3	22.85	48.1	60	80.1	100	48.1
304_1408_1	304	1408	220	132	42.3	22.85	48.1	60	80.1	100	48.1
304_1408_2	304	1408	220	132	42.3	22.85	48.1	60	80.1	100	48.1
305_1373_1	305	1373	220	132	42.3	-2.11	42.4	60	70.6	100	42.4
305_1373_2	305	1373	220	132	42.3	-2.11	42.4	60	70.6	100	42.4
317_1542_1	317	1542	220	132	42.3	21.64	47.5	60	79.2	100	47.5
317_1542_2	317	1542	220	132	42.3	21.64	47.5	60	79.2	100	47.5
325_1150_1	325	1150	220	132	42.3	7.71	43	60	71.7	100	43
325_1150_2	325	1150	220	132	42.3	7.71	43	60	71.7	100	43
326_1388_1	**326**	**1388**	**220**	**132**	**27**	**13.55**	**30.2**	**60**	**50.3**	**100**	**30.2**

326_1388_2	326	1388	220	132	27	13.55	30.2	60	50.3	100	30.2
327_1015_1	327	1015	220	132	54	30.25	61.9	60	103.2	100	61.9
327_1015_2	327	1015	220	132	54	30.25	61.9	60	103.2	100	61.9
327_1015_3	327	1015	220	132	54	30.25	61.9	60	103.2	100	61.9
330_1152_1	330	1152	220	132	54	16.99	56.6	60	94.3	100	56.6
330_1152_2	330	1152	220	132	54	16.99	56.6	60	94.3	100	56.6
330_1152_3	330	1152	220	132	54	16.99	56.6	60	94.3	100	56.6
333_1006_1	333	1006	220	132	53.25	19.58	56.7	60	94.6	100	56.7
333_1006_2	333	1006	220	132	42.6	15.66	45.4	60	75.6	100	45.4
333_1006_3	333	1006	220	132	53.25	19.58	56.7	60	94.6	100	56.7
335_1081_1	335	1081	220	132	54	30.11	61.8	60	103	100	61.8
335_1081_2	**335**	**1081**	**220**	**132**	**54**	**30.11**	**61.8**	**60**	**103**	**100**	**61.8**
335_1081_3	335	1081	220	132	54	30.11	61.8	60	103	100	61.8
338_1322_1	338	1322	220	132	63	34.58	71.9	96	74.9	160	44.9
338_1322_2	**338**	**1322**	**220**	**132**	**63**	**34.58**	**71.9**	**96**	**74.9**	**160**	**44.9**
340_1120_1	**340**	**1120**	**220**	**132**	**45.72**	**25.75**	**52.5**	**60**	**87.5**	**100**	**52.5**
340_1120_2	340	1120	220	132	45.72	25.75	52.5	60	87.5	100	52.5
341_1116_1	341	1116	220	132	42.3	7.9	43	60	71.7	100	43
341_1116_2	341	1116	220	132	42.3	7.9	43	60	71.7	100	43
357_1144_1	357	1144	220	132	25.65	12.84	28.7	60	47.8	100	28.7
357_1144_2	357	1144	220	132	25.65	12.84	28.7	60	47.8	100	28.7
367_1123_1	367	1123	220	132	27	14.03	30.4	60	50.7	100	30.4
367_1123_2	367	1123	220	132	27	14.03	30.4	60	50.7	100	30.4
368_1062_1	368	1062	220	132	38.7	19.7	43.4	60	72.4	100	43.4
368_1062_2	368	1062	220	132	38.7	19.7	43.4	60	72.4	100	43.4
377_1082_1	377	1082	220	132	42.3	23.56	48.4	60	80.7	100	48.4
377_1082_2	377	1082	220	132	42.3	23.56	48.4	60	80.7	100	48.4
380_1390_1	380	1390	220	132	42.3	22.86	48.1	60	80.1	100	48.1
380_1390_2	380	1390	220	132	42.3	22.86	48.1	60	80.1	100	48.1
387_1512_1	387	1512	220	132	42.3	22.8	48.1	60	80.1	100	48.1
387_1512_2	387	1512	220	132	42.3	22.8	48.1	60	80.1	100	48.1
392_1451_1	392	1451	220	132	54	31.57	62.6	60	104.3	100	62.6

392_1451_2	392	1451	220	132	54	31.57	62.6	60	104.3	100	62.6
392_1451_3	392	1451	220	132	54	31.57	62.6	60	104.3	100	62.6
396_1588_1	396	1588	220	132	3.6	1.76	4.01	60	6.7	100	4
396_1588_2	396	1588	220	132	3.6	1.76	4.01	60	6.7	100	4
399_1122_1	399	1122	220	132	42.3	22.82	48.1	60	80.1	100	48.1
399_1122_2	**399**	**1122**	**220**	**132**	**42.3**	**22.82**	**48.1**	**60**	**80.1**	**100**	**48.1**
401_206_1	**401**	**206**	**400**	**220**	**-13.3**	**8.31**	**15.7**	**190**	**8.3**	**315**	**5**
401_206_2	**401**	**206**	**400**	**220**	**-13.3**	**8.31**	**15.7**	**190**	**8.3**	**315**	**5**
404_230_1	404	230	400	220	61.85	0.77	61.9	190	32.6	315	19.6
404_230_2	**404**	**230**	**400**	**220**	**61.85**	**0.77**	**61.9**	**190**	**32.6**	**315**	**19.6**
404_230_3	**404**	**230**	**400**	**220**	**61.85**	**0.77**	**61.9**	**190**	**32.6**	**315**	**19.6**
405_238_1	405	238	400	220	27.87	11.58	30.2	190	15.9	315	9.6
405_238_2	405	238	400	220	27.87	11.58	30.2	190	15.9	315	9.6
406_262_1	**406**	**262**	**400**	**220**	**143.8**	**4.48**	**144**	**190**	**75.7**	**315**	**45.7**
406_262_2	406	262	400	220	143.8	4.48	144	190	75.7	315	45.7
407_234_1	**407**	**234**	**400**	**220**	**155.4**	**25.26**	**157**	**190**	**82.9**	**315**	**50**
407_234_2	407	234	400	220	155.4	25.26	157	190	82.9	315	50
407_234_3	407	234	400	220	155.4	25.26	157	190	82.9	315	50
410_287_1	410	287	400	220	203.4	26.9	205	190	108	315	65.1
410_287_2	**410**	**287**	**400**	**220**	**203.4**	**26.9**	**205**	**190**	**108**	**315**	**65.1**
412_297_1	412	297	400	220	144.8	23.1	147	190	77.1	315	46.5
412_297_2	412	297	400	220	144.8	23.1	147	190	77.1	315	46.5
412_297_3	**412**	**297**	**400**	**220**	**144.8**	**23.1**	**147**	**190**	**77.1**	**315**	**46.5**
412_297_4	412	297	400	220	144.8	23.1	147	190	77.1	315	46.5
416_298_1	416	298	400	220	183	48.48	189	190	99.6	315	60.1
416_298_2	416	298	400	220	183	48.48	189	190	99.6	315	60.1
421_318_1	421	318	400	220	129	7.61	129	190	68	315	41
421_318_2	421	318	400	220	129	7.61	129	190	68	315	41
432_381_1	**432**	**381**	**400**	**220**	**108**	**32.66**	**113**	**190**	**59.4**	**315**	**35.8**
432_381_2	432	381	400	220	108	32.66	113	190	59.4	315	35.8
432_381_3	**432**	**381**	**400**	**220**	**108**	**32.66**	**113**	**190**	**59.4**	**315**	**35.8**
441_260_1	441	260	400	220	-7.94	11.53	14	190	7.4	315	4.4

441_260_2	441	260	400	220	-7.94	11.53	14	190	7.4	315	4.4
441_260_3	441	260	400	220	-7.94	11.53	14	190	7.4	315	4.4
441_260_4	**441**	**260**	**400**	**220**	**-7.94**	**11.53**	**14**	**190**	**7.4**	**315**	**4.4**
511_642_1	511	642	400	220	114.9	40.86	122	190	64.2	315	38.7
511_642_2	511	642	400	220	114.9	40.86	122	190	64.2	315	38.7
517_622_1	517	622	400	220	113.9	48.81	124	190	65.2	315	39.3
517_622_2	517	622	400	220	113.9	48.81	124	190	65.2	315	39.3
518_646_1	518	646	400	220	131.9	32.01	136	190	71.4	315	43.1
518_646_2	518	646	400	220	131.9	32.01	136	190	71.4	315	43.1
529_317_1	529	317	400	220	196.5	30.85	199	190	104.7	315	63.1
529_317_2	**529**	**317**	**400**	**220**	**196.5**	**30.85**	**199**	**190**	**104.7**	**315**	**63.1**
529_317_3	529	317	400	220	196.5	30.85	199	190	104.7	315	63.1
529_317_4	529	317	400	220	196.5	30.85	199	190	104.7	315	63.1
545_807_1	545	807	400	220	71.89	48.93	87	190	45.8	315	27.6
545_807_2	545	807	400	220	71.89	48.93	87	190	45.8	315	27.6
552_774_1	552	774	400	220	124.9	41.44	132	190	69.3	315	41.8
552_774_2	552	774	400	220	124.9	41.44	132	190	69.3	315	41.8
552_774_3	552	774	400	220	124.9	41.44	132	190	69.3	315	41.8
552_774_4	552	774	400	220	124.9	41.44	132	190	69.3	315	41.8
553_775_1	553	775	400	220	-25.8	-4.36	26.2	190	13.8	315	8.3
553_775_2	553	775	400	220	-25.8	-4.36	26.2	190	13.8	315	8.3
553_775_3	**553**	**775**	**400**	**220**	**-40.9**	**-6.92**	**41.5**	**300**	**13.8**	**500**	**8.3**
553_775_4	553	775	400	220	-40.9	-6.92	41.5	300	13.8	500	8.3
554_776_1	**554**	**776**	**400**	**220**	**122**	**18.69**	**123**	**190**	**65**	**315**	**39.2**
554_776_2	**554**	**776**	**400**	**220**	**122**	**18.69**	**123**	**190**	**65**	**315**	**39.2**
555_777_1	555	777	400	220	53.33	17.63	56.2	190	29.6	315	17.8
555_777_2	555	777	400	220	53.33	17.63	56.2	190	29.6	315	17.8
555_777_3	**555**	**777**	**400**	**220**	**53.33**	**17.63**	**56.2**	**190**	**29.6**	**315**	**17.8**
558_791_1	**558**	**791**	**400**	**220**	**21.9**	**3.46**	**22.2**	**190**	**11.7**	**315**	**7**
558_791_2	558	791	400	220	21.9	3.46	22.2	190	11.7	315	7
558_791_3	558	791	400	220	21.9	3.46	22.2	190	11.7	315	7
559_792_1	559	792	400	220	-82	13.83	83.2	190	43.8	315	26.4

559_792_2	559	792	400	220	-82	13.83	83.2	190	43.8	315	26.4
559_792_3	559	792	400	220	-82	13.83	83.2	190	43.8	315	26.4
561_805_1	561	805	400	220	111.4	58.64	126	190	66.3	315	40
561_805_2	**561**	**805**	**400**	**220**	**111.4**	**58.64**	**126**	**190**	**66.3**	**315**	**40**
562_806_1	562	806	400	220	87.3	36.21	94.5	300	31.5	500	18.9
562_806_2	562	806	400	220	87.3	36.21	94.5	300	31.5	500	18.9
563_812_1	563	812	400	220	-66.7	6.42	67	190	35.2	315	21.3
563_812_2	563	812	400	220	-66.7	6.42	67	190	35.2	315	21.3
563_812_3	**563**	**812**	**400**	**220**	**-66.7**	**6.42**	**67**	**190**	**35.2**	**315**	**21.3**
568_816_1	568	816	400	220	68.4	9.34	69	190	36.3	315	21.9
568_816_2	568	816	400	220	68.4	9.34	69	190	36.3	315	21.9
572_824_1	572	824	400	220	-33.3	7.54	34.2	190	18	315	10.8
572_824_2	572	824	400	220	-33.3	7.54	34.2	190	18	315	10.8
572_824_3	572	824	400	220	-33.3	7.54	34.2	190	18	315	10.8
573_825_1	573	825	400	220	-87.5	3.09	87.6	190	46.1	315	27.8
573_825_2	573	825	400	220	-87.5	3.09	87.6	190	46.1	315	27.8
573_825_3	573	825	400	220	-87.5	3.09	87.6	190	46.1	315	27.8
573_825_4	**573**	**825**	**400**	**220**	**-87.5**	**3.09**	**87.6**	**190**	**46.1**	**315**	**27.8**
574_826_1	574	826	400	220	-66.7	11.8	67.7	190	35.6	315	21.5
574_826_2	**574**	**826**	**400**	**220**	**-66.7**	**11.8**	**67.7**	**190**	**35.6**	**315**	**21.5**
574_826_3	**574**	**826**	**400**	**220**	**-66.7**	**11.8**	**67.7**	**190**	**35.6**	**315**	**21.5**
575_800_1	575	800	400	220	145	68.81	160	190	84.5	315	50.9
575_800_2	**575**	**800**	**400**	**220**	**145**	**68.81**	**160**	**190**	**84.5**	**315**	**50.9**
605_1470_1	**605**	**1470**	**220**	**132**	**42.3**	**22.89**	**48.1**	**60**	**80.2**	**100**	**48.1**
605_1470_2	**605**	**1470**	**220**	**132**	**42.3**	**22.89**	**48.1**	**60**	**80.2**	**100**	**48.1**
606_1471_1	**606**	**1471**	**220**	**132**	**36**	**18.74**	**40.6**	**96**	**42.3**	**160**	**25.4**
606_1471_2	**606**	**1471**	**220**	**132**	**36**	**18.74**	**40.6**	**96**	**42.3**	**160**	**25.4**
607_1473_1	607	1473	220	132	42.3	22.82	48.1	60	80.1	100	48.1
607_1473_2	607	1473	220	132	42.3	22.82	48.1	60	80.1	100	48.1
643_1501_1	643	1501	220	132	42.3	23.48	48.4	60	80.6	100	48.4
643_1501_2	643	1501	220	132	42.3	23.48	48.4	60	80.6	100	48.4
645_1503_1	645	1503	220	132	27	14	30.4	60	50.7	100	30.4

656_1515_1	656	1515	220	132	27	14.02	30.4	60	50.7	100	30.4
656_1515_2	**656**	**1515**	**220**	**132**	**27**	**14.02**	**30.4**	**60**	**50.7**	**100**	**30.4**
662_1522_1	662	1522	220	132	42.3	23.47	48.4	60	80.6	100	48.4
662_1522_2	662	1522	220	132	42.3	23.47	48.4	60	80.6	100	48.4
665_1525_1	**665**	**1525**	**220**	**132**	**42.3**	**22.9**	**48.1**	**60**	**80.2**	**100**	**48.1**
665_1525_2	665	1525	220	132	42.3	22.9	48.1	60	80.2	100	48.1
667_1527_1	667	1527	220	132	46.82	16.7	49.7	60	82.9	100	49.7
667_1527_2	**667**	**1527**	**220**	**132**	**46.82**	**16.7**	**49.7**	**60**	**82.9**	**100**	**49.7**
667_1527_3	**667**	**1527**	**220**	**132**	**46.82**	**16.7**	**49.7**	**60**	**82.9**	**100**	**49.7**
668_1528_1	668	1528	220	132	38.82	21.39	44.3	60	73.9	100	44.3
668_1528_2	668	1528	220	132	38.82	21.39	44.3	60	73.9	100	44.3
686_1540_1	686	1540	220	132	22.59	11.59	25.4	60	42.3	100	25.4
686_1540_2	686	1540	220	132	22.59	11.59	25.4	60	42.3	100	25.4
710_1552_1	710	1552	220	132	18	-6.07	19	60	31.7	100	19
710_1552_2	710	1552	220	132	18	-6.07	19	60	31.7	100	19
723_1557_1	723	1557	220	132	41.25	15.1	43.9	60	73.2	100	43.9
723_1557_2	**723**	**1557**	**220**	**132**	**41.25**	**15.1**	**43.9**	**60**	**73.2**	**100**	**43.9**
723_1557_3	**723**	**1557**	**220**	**132**	**66**	**24.16**	**70.3**	**96**	**73.2**	**160**	**43.9**
724_1553_1	724	1553	220	132	36.23	19.36	41.1	60	68.5	100	41.1
724_1553_2	724	1553	220	132	46.38	24.79	52.6	96	54.8	160	32.9
724_1553_3	724	1553	220	132	28.99	15.49	32.9	60	54.8	100	32.9
734_1514_1	734	1514	220	132	42.3	23.55	48.4	60	80.7	100	48.4
734_1514_2	734	1514	220	132	42.3	23.55	48.4	60	80.7	100	48.4
758_1112_1	758	1112	220	132	42.3	22.82	48.1	60	80.1	100	48.1
758_1112_2	**758**	**1112**	**220**	**132**	**42.3**	**22.82**	**48.1**	**60**	**80.1**	**100**	**48.1**
768_1190_1	**768**	**1190**	**220**	**132**	**36.91**	**14.82**	**39.8**	**60**	**66.3**	**100**	**39.8**
768_1190_2	768	1190	220	132	36.91	14.82	39.8	60	66.3	100	39.8
769_1559_1	769	1559	220	132	42.3	23.53	48.4	60	80.7	100	48.4
769_1559_2	**769**	**1559**	**220**	**132**	**42.3**	**23.53**	**48.4**	**60**	**80.7**	**100**	**48.4**
778_1561_1	778	1561	220	132	18	9.03	20.1	96	21	160	12.6
778_1561_2	778	1561	220	132	18	9.03	20.1	96	21	160	12.6
779_1562_1	779	1562	220	132	18	9.03	20.1	96	21	160	12.6

779_1562_2	779	1562	220	132	18	9.03	20.1	96	21	160	12.6
780_1563_1	780	1563	220	132	24.75	12.47	27.7	96	28.9	160	17.3
780_1563_2	780	1563	220	132	24.75	12.47	27.7	96	28.9	160	17.3
781_1564_1	781	1564	220	132	27	13.8	30.3	96	31.6	160	19
781_1564_2	781	1564	220	132	27	13.8	30.3	96	31.6	160	19
782_1565_1	782	1565	220	132	27	13.8	30.3	96	31.6	160	19
782_1565_2	782	1565	220	132	27	13.8	30.3	96	31.6	160	19
783_1566_1	783	1566	220	132	27	13.8	30.3	96	31.6	160	19
783_1566_2	783	1566	220	132	27	13.8	30.3	96	31.6	160	19
784_1567_1	**784**	**1567**	**220**	**132**	**27**	**13.65**	**30.3**	**96**	**31.5**	**160**	**18.9**
784_1567_2	784	1567	220	132	27	13.65	30.3	96	31.5	160	18.9
785_1568_1	**785**	**1568**	**220**	**132**	**13.5**	**6.82**	**15.1**	**60**	**25.2**	**100**	**15.1**
785_1568_2	785	1568	220	132	13.5	6.82	15.1	60	25.2	100	15.1
786_1569_1	786	1569	220	132	13.5	6.71	15.1	96	15.7	160	9.4
786_1569_2	786	1569	220	132	13.5	6.71	15.1	96	15.7	160	9.4
789_1586_1	789	1586	220	132	4.5	2.21	5.01	60	8.4	100	5
793_1585_1	793	1585	220	132	27	14.25	30.5	60	50.9	100	30.5
793_1585_2	793	1585	220	132	27	14.25	30.5	60	50.9	100	30.5
794_1573_1	794	1573	220	132	42.3	23.49	48.4	60	80.6	100	48.4
794_1573_2	**794**	**1573**	**220**	**132**	**42.3**	**23.49**	**48.4**	**60**	**80.6**	**100**	**48.4**
797_1576_1	797	1576	220	132	42.3	23.53	48.4	60	80.7	100	48.4
797_1576_2	797	1576	220	132	42.3	23.53	48.4	60	80.7	100	48.4
798_1577_1	**798**	**1577**	**220**	**132**	**52.29**	**20.84**	**56.3**	**60**	**93.8**	**100**	**56.3**
798_1577_2	**798**	**1577**	**220**	**132**	**52.29**	**20.84**	**56.3**	**60**	**93.8**	**100**	**56.3**
798_1577_3	798	1577	220	132	52.29	20.84	56.3	60	93.8	100	56.3
799_1578_1	799	1578	220	132	42.3	8.19	43.1	60	71.8	100	43.1
799_1578_2	799	1578	220	132	42.3	8.19	43.1	60	71.8	100	43.1
800_1579_1	800	1579	220	132	47.13	26.7	54.2	60	90.3	100	54.2
800_1579_2	800	1579	220	132	47.13	26.7	54.2	60	90.3	100	54.2
800_1579_3	800	1579	220	132	47.13	26.7	54.2	60	90.3	100	54.2
801_1581_1	801	1581	220	132	26.92	14.28	30.5	60	50.8	100	30.5
801_1581_2	801	1581	220	132	26.92	14.28	30.5	60	50.8	100	30.5

810_1589_1	810	1589	220	132	42.3	23.64	48.5	60	80.8	100	48.5
810_1589_2	810	1589	220	132	42.3	23.64	48.5	60	80.8	100	48.5
811_1592_1	811	1592	220	132	42.3	23.43	48.4	60	80.6	100	48.4
811_1592_2	811	1592	220	132	42.3	23.43	48.4	60	80.6	100	48.4
817_1593_1	817	1593	220	132	42.3	23.49	48.4	60	80.6	100	48.4
817_1593_2	817	1593	220	132	42.3	23.49	48.4	60	80.6	100	48.4
951_542_1	951	542	765	400	310.7	-11.28	311	900	34.5	1500	20.7
951_542_2	951	542	765	400	310.7	-11.28	311	900	34.5	1500	20.7
954_569_1	954	569	765	400	145	204.8	251	900	27.9	1500	16.7
954_569_2	954	569	765	400	145	204.8	251	900	27.9	1500	16.7

SUMMARY REPORT FOR STUDY 2019

LOAD FLOW STUDY PARAMETERS		
Study : : SC12		
Time : : Thu Dec 29 11h20m43s 2016		
Method : : Newton-Raphson		
Constraints : : Not applied		
Flat start : : Yes		
Tcul txfo used as fixed tap : : n\a		
Block Q-flow Txfo Adjustment : n\a		
Block P-flow Txfo Adjustment : n\a		
Block Switchable Shunt Adjustment : n\a		
Block DC Link Adjustment : n\a		
Base power : [MVA] = 100.00		
Tolerance : [MVA] = 1.000		
COMPLETE SUMMARY REPORT		
Total generation	10067.89	-4204.14
Static Load	9973.93	4830.60
Shunt loads	0.00	-1604.76
Motor loads	0.00	0.00
Total load	9973.93	3225.84
Line / cable losses	93.94	-9173.29
Transformer losses	0.00	1743.31
Total losses	93.94	-7429.98
Mismatches	0.01	0.00
Summary report for area: AP		
Total generation	14451.89	-608.73
Static Load	9973.94	4830.59
Shunt loads	0.00	-1604.76
Motor loads	0.00	0.00
Total load	9973.94	3225.84
Line / cable losses	93.79	-9171.45
Transformer losses	0.00	1743.31
Total losses	93.79	-7428.14
SUMMARY REPORT FOR ZONE: 1		

Total generation	0.00	0.00
Static Load	310.50	150.38
Shunt loads	0.00	-68.29
Motor loads	0.00	0.00
Total load	310.50	82.09
Line / cable losses	2.33	-17.25
Transformer losses	0.00	23.23
Total losses	2.33	5.98
SUMMARY REPORT FOR ZONE: 2		
Total generation	0.00	0.00
Static Load	310.50	150.38
Shunt loads	0.00	-26.36
Motor loads	0.00	0.00
Total load	310.50	124.02
Line / cable losses	5.35	-185.45
Transformer losses	0.00	41.52
Total losses	5.35	-143.93
SUMMARY REPORT FOR ZONE: 3		
Total generation	2663.39	427.63
Static Load	1010.34	489.33
Shunt loads	0.00	-286.18
Motor loads	0.00	0.00
Total load	1010.34	203.15
Line / cable losses	5.77	-313.16
Transformer losses	0.00	232.98
Total losses	5.77	-80.18
SUMMARY REPORT FOR ZONE: 4		
Total generation	1856.60	162.08
Static Load	962.39	466.11
Shunt loads	0.00	-85.47
Motor loads	0.00	0.00
Total load	962.39	380.63
Line / cable losses	7.56	-891.25
Transformer losses	0.00	175.37
Total losses	7.56	-715.88
SUMMARY REPORT FOR ZONE: 5		
Total generation	180.00	-45.77
Static Load	974.07	471.76
Shunt loads	0.00	-54.32

Motor loads	0.00	0.00
Total load	974.07	417.45
Line / cable losses	7.56	-578.26
Transformer losses	0.00	94.51
Total losses	7.56	-483.75
SUMMARY REPORT FOR ZONE: 6		
Total generation	2123.54	240.14
Static Load	875.85	424.20
Shunt loads	0.00	-48.82
Motor loads	0.00	0.00
Total load	875.85	375.38
Line / cable losses	7.54	-375.96
Transformer losses	0.00	190.07
Total losses	7.54	-185.89
SUMMARY REPORT FOR ZONE: 7		
Total generation	40.00	1.38
Static Load	963.97	466.87
Shunt loads	0.00	-85.76
Motor loads	0.00	0.00
Total load	963.97	381.11
Line / cable losses	8.97	-1074.61
Transformer losses	0.00	90.56
Total losses	8.97	-984.05
SUMMARY REPORT FOR ZONE: 8		
Total generation	0.00	0.00
Static Load	572.94	277.49
Shunt loads	0.00	-48.89
Motor loads	0.00	0.00
Total load	572.94	228.60
Line / cable losses	4.77	-221.95
Transformer losses	0.00	57.40
Total losses	4.77	-164.54
SUMMARY REPORT FOR ZONE: 9		
Total generation	3567.00	-199.88
Static Load	622.24	301.37
Shunt loads	0.00	-89.15
Motor loads	0.00	0.00
Total load	622.24	212.22

Line / cable losses	8.31	-1504.06
Transformer losses	0.00	444.03
Total losses	8.31	-1060.03
SUMMARY REPORT FOR ZONE: 10		
Total generation	0.00	0.00
Static Load	949.74	459.98
Shunt loads	0.00	-337.19
Motor loads	0.00	0.00
Total load	949.74	122.79
Line / cable losses	14.76	-709.99
Transformer losses	0.00	84.90
Total losses	14.76	-625.10
SUMMARY REPORT FOR ZONE: 11		
Total generation	1692.00	-77.90
Static Load	813.78	394.13
Shunt loads	0.00	-163.89
Motor loads	0.00	0.00
Total load	813.78	230.24
Line / cable losses	7.27	-597.92
Transformer losses	0.00	107.70
Total losses	7.27	-490.22
SUMMARY REPORT FOR ZONE: 12		
Total generation	1680.50	-112.90
Static Load	985.30	477.20
Shunt loads	0.00	-255.15
Motor loads	0.00	0.00
Total load	985.30	222.05
Line / cable losses	8.44	-863.85
Transformer losses	0.00	101.27
Total losses	8.44	-762.58
SUMMARY REPORT FOR ZONE: 13		
Total generation	648.85	-1003.52
Static Load	622.31	301.40
Shunt loads	0.00	-55.28
Motor loads	0.00	0.00
Total load	622.31	246.11

Line / cable losses	5.16	-1837.73
Transformer losses	0.00	99.77
Total losses	5.16	-1737.96
SUMMARY REPORT FOR ZONE: 70		
Total generation	-4384.00	-3595.41
Static Load	0.00	0.00
Shunt loads	0.00	0.00
Motor loads	0.00	0.00
Total load	0.00	0.00
Line / cable losses	0.15	-1.84
Transformer losses	0.00	0.00
Total losses	0.15	-1.84

SHORT CIRCUIT STUDY RESULTS I.E FAULT LEVELS AT ALL765KV 400KV, 200KV&132KV BUSES

Bus Id	NAME OF THE BUS	Prefault kV	LLL Ia [A]	LG Ia [A]
201	APCARBIDES	216.92	13454.5	7804.7
202	BHIMADOLE	214.54	17357.6	11215.7
203	BOMMUR	217.78	31288.1	32930.9
204	KADAPA	216.37	12602.7	13559.8
206	CHINAKAMPALLY	219.31	26328.8	22816.3
207	CHITTOOR	220	9517.7	8823.9
208	DONKARAI	220.15	9413.3	11620.6
209	GUNADALA	219.77	31472	25088.2
211	TADIKONDA	218.67	16372.3	10444.6
212	GOOTY	218.83	25861	17619
213	GARIVIDI	210.29	10915.1	8316.7
214	GAJUWAKA	217.43	23247.3	25257.4
216	KONDAPALLI	220.38	33122.2	34127.3
218	LOWER SILERU	220	12889.9	15071.3
221	NELLORE	216.64	22319.2	18439.7
223	ONGOLE	210.44	10639.3	6334.3
227	SULLURPET	219.99	14615.8	9215.1
229	SRISAIALM	220	21751.2	22351.2
230	TALLAPALLI	220	26010.1	25170.4
231	UPPER SILERU	220.2	8190.7	10344.2
232	VIJJESWARAM	217.94	17293.2	15726.7
233	VSP PLANT	218.1	28060.2	27140.4
234	VIZAG SWITCHING STATION	218.22	34005.3	32854.3
235	VIJAYAWADA THERMAL POWER STATION	220.55	45020.2	53452.1
238	GOOTY	219.01	31621.9	22180.2
239	KALIKIRI	219.5	12184.6	11814.2
242	MYDUKUR	216.95	6705.8	8090.3
243	RAJAMPETA	216.28	7077.3	3818.2
244	HINDUPUR	220.4	21747.3	13735.4

246	PENDUGONDA	215.83	21715.1	23875.8
249	RENIGUNTA 220KV	216.22	17416	10096.3
251	SOMAYAJULAPALLI	217.7	18797	11092.1
254	PODILI 220KV	214.49	19924.4	15496.1
256	MUDDANUR 220KV	220.38	27608.2	32571.1
257	YERRAGUNTLA	219.29	16227.8	12354
258	ANANTHAPUR	219.79	24620.1	19563
260	HINDUPUR 400KV/200KV SS	220.94	27424.2	20549.9
261	NANDYALA	214.74	8899.9	4818.6
262	NUNNA	220	37043.3	28037.2
263	RAMAGIRI	220.14	11914	6604.1
264	KODUR	215.97	7973	4253.2
266	JEGURUPADU 220KV BUS	218.94	20941.5	22832.8
267	SPECTRUM (KGS) 220KV BUS	218.08	10770.2	13612.4
274	KAKINADA	217.03	12054.1	12679.8
276	CHILLAKALLU	220	14113.8	14862.7
277	VIJJESWARAM NEW 220KV BUS	217.36	25465.4	24674.6
278	BOGASAMUDRAM	218.05	5942.9	3158.1
282	NIDADAVOLE 220KV	216.73	22878.3	19576.3
287	KURNOOL	218.39	19259.3	11935
290	LANCHO	220.39	32565.9	33657.5
293	GUDIVADA	215.81	14032.5	14157.6
297	VIZAG SWITCHING STATION	218.36	33541.1	30300.1
298	VEMAGIRI	217.87	31366.9	33034.5
301	KALYANDURG	221.46	20659.7	18234
303	PEDDAPURAM (SAMARLAKOTA)	217.55	21836.6	22962
304	PARWADA	217.63	22335.4	16047.6
305	MARKAPURAM	216.86	6885.1	3820.1
307	RELIANCE	217.66	20193.7	21592.2
317	MANUBOLU 220KV SS	218.1	29182.1	21447.3
318	CHITTOOR 400KV 220KV BUS	219.63	14145.6	9947.4
324	BOGASAMUDRAM	218.91	10282.4	5935.9
325	TADIPATRI	218.9	12189.7	7733.4
326	DAIRY FARM	216.05	16712.4	12387.9

327	BHIMAVARAM	212.68	14084.8	15783.1
329	RAMPACHODAVARAM	216.98	3864.5	4916.2
330	TEKKALI	204.56	4227.1	2461.3
331	PENNA	218.35	4826	2586.5
333	AMALAPURAM	214.49	11480.7	13513.3
335	KAMAVARAPUKOTA	216.25	13786.3	8239.3
338	AMARAVATHI	219.2	28326.7	20965.8
340	PARCHUR	214.95	14256.4	8941.2
341	PALAMANERU	217.68	8069.4	4946
357	DHARAMAVARAM	217.58	4934.1	3152
367	NAGARI	216.44	8984.3	4963.8
368	GOLLAPURAM	218.51	11614.1	6734.5
377	ATMAKUR	214.83	11088.1	11428.9
380	NARSARAOPETA	217.06	19574.4	12405
381	NARSARAOPETA 220kV	217.35	22420.8	14693
387	NUNNA 200 KV	219.85	31828.7	22503.6
392	KANDUKUR	209.08	7516.6	4655.8
396	MUTYALACHERUVU	218.92	6231	3688.8
399	PULIVENDULA	218.77	13846.4	8785.3
401	CHINAKAMPALLY	400.07	20558.7	14942
404	TALLAPALLI 400KV	400	15005.8	11934.9
405	GOOTYNEW 400 KV	400.01	25444.1	20457.1
406	NUNNA	400.05	28797.4	25127.2
407	VSS	400.01	39177.8	39565
410	KURNOOL	400.03	43412.9	38317.3
412	KALPAKA (VIZAG GENARATION)	400.02	39780.1	40574.7
414	SIMHADRI	400.29	39483.3	39031.6
415	SIMHADRI EXTN 400KV BUS	400.4	39264.3	38390
416	VEMAGIRI	402.72	36871.3	39610.1
417	GMR(VMG)	402.68	35446.4	37510.6
419	VEMAGIRI 765KV 400KV BUS	402.87	35430.4	34778.4
421	CHITTOOR	400.01	16398.8	12343
422	NELLORE	400.02	43357.6	40627.7
427	VIJAYAWADA THERMAL POWER STATION STAGE-4	400.01	26110.1	27960.6

432	NARSARAOPETA	400.01	22956.9	18852
441	ANANTHAPUR	403.52	20668.4	13591.9
481	GAUTAMI	402.46	20112.7	21386.7
482	EPS	402.43	24078.9	24996.3
490	JEGURUPADU EXTN 400KV BUS	402.7	31718	30058.2
511	KAMAVARAPUKOTA 400KV	400.01	21639	17026.8
515	KRISHNAPATNAM 400KV BUS	400.86	34428.3	38489.4
517	PODILI 400KV	397.61	11096	7260
518	RACHAGUNEERI 400KV	400.91	18412.4	12187.5
519	MUDDANUR 400kV BUS	403.4	8131.1	9655.1
529	MANUBOLU 220KV SS	400.22	42181.5	38200.8
535	POLAVARAM 400KV BUS	400.66	14306	18419.7
541	KRISHNAPATNAM NCC GEN 400KV BUS	401.57	36654.3	34037.3
542	KURNUL-765	400.51	43644.8	40118
545	CHILAKALURIPETA 400KV AP	401.04	11046.1	6840.2
547	LANCO EXTN 400KV	400.24	21235.1	18629.9
552	GARIVIDI	395.51	13557.5	8911
553	URAVAKONDA 400KV SS	400.02	29193.5	27115
554	KALIKIRI	402.36	11661.6	9347.6
555	JAMMALAMADUGU 400KV BUS	402.43	32286.2	27093.3
556	HINDUJA THERMAL POWER PLANT 400KV BUS	400.16	37531.3	38770.6
558	ASPIRI WIND GEN 400KV BUS	400.22	25527.1	17793.6
559	N.P.KUNTA GEN 400KV BUSS	402.45	20588.6	14637.8
561	ELURU	402.18	20494.6	14843.5
562	GUDIVADA	402.05	17183.7	12376.3
563	PANYAM	401.38	31453.5	23122.2
564	NELLORE POOLING STATION	401.64	44244	46739.3
565	KRISHNAPATNAM THERMAL POWER TECH 400KV BUS	401.57	36654.3	34037.3
566	KRISHNA PATNAM MINAKSHI	401.2	38753.9	41058.1
567	KRISHANPATNAM SIMHAPURI 400KV BUS	401.24	38749.4	40411.7
568	INAVOLU/THULLUR	400.09	24207.6	22204.8

569	NELLORE 765KV 400KV BUS	402.3	41167.2	39286.2
572	TALLARICHERUVU	402.48	27948.7	22492.7
573	URAVAKONDA -2 400KV BUS	400.22	23240.2	21716.4
574	MYLAVARAM	402.38	28414.8	23977.8
575	KAKINDA SEZ	399.55	16974.9	11113.4
605	ELURU 400KV SS 220 KV BUS	215.98	22661.5	17010.2
606	CHERIVI	218.57	12999.3	7941.8
607	ADOINI	218.75	15372.7	11744.8
615	GANGAVARAM	217.73	22548.1	24077.9
622	PODILI 400KV SS 220KV BUS	214.63	19605.2	14457.3
623	B.K.KOTHUR	220	10239.7	6286.4
624	SETTIPALLI	217.31	8140.4	4348.5
634	KANIGIRI	217.47	10925.7	5958.9
635	LAKKASAGARAM-1	217.21	10254.7	7582.6
636	LAKKASAGARAM-2	216.91	7822.5	6448.6
637	NANASARULA	216.79	6658.2	5808.9
639	MALYALA LI	219.69	7843.3	4583.3
642	KAMAVARAPU KOTA 400KV SS 220KV BUS	216.67	14669.9	8838.6
643	BRANDIX	217.46	16476.2	10626.9
645	RENTACHINTALA	219.94	9977.7	6837.1
646	RACHAGUNEERI 400KV SS 220KV BUS	218.01	21031.8	12942
656	RACHAGUNNERI	217.91	19231.4	11711.5
657	DHONE	217.79	17156.5	9817.9
662	KORPROLU 400KV SS 220KV BUS	217.82	12684.6	7399.5
663	GAIL	213.48	12962.9	8281
665	PALLANTLA	215.36	16619.9	11191.8
667	GUNTUR	215.3	15359.4	9563.6
668	KUPPAM	214.33	4018.8	2355.8
686	KONDAPURAM/JAMMALAMADUGU	219.39	13869.2	8555.5
687	TIMMAPURAM	219.59	16597.5	10709.4
688	YELLANUR	219.51	13918.2	8591.5
689	GADDAMVARIPALLI	219.46	12739.3	7716.7

690	GODDUMARRI	219.39	10893.1	6410.7
691	SBQ STEEL	217.08	10644.8	6057.7
692	APAR - PARK	216.87	8702	4837.9
704	REGULAPADU LI	220	6403.1	6837.9
705	NAGARJUNA SAGAR TAIL POND 220KV BUS	220.02	8243.9	5885.5
709	THIMMAPURAM	219.86	9663.5	10260.7
710	MADANAPALLI	219.72	8656.2	6143.1
723	PYDHIBHIMAVARAM	212.27	10312.5	6685.1
724	BOBBILI	212.1	12580.8	8582.5
734	CHILAKALURIPETA 400KV 220KV BUS	215.01	10717	6461.2
756	MUCHUMARRI	219.6	5969	3453.8
758	PIDUGURALLA	218.88	13698.1	8175.3
762	BMPP - RELIANCE	218.65	11691.2	11288.4
763	ADRPALEM	215.65	15653.2	12996.9
764	ABFL BULK LOAD	217.96	13051	8157.4
765	BECL BULK LOAD	218.26	10550.2	6114.1
766	HINDUSTAN ZINC LTD BULK LOAD	219.26	14800.3	9763.9
768	MACHILIPATNAM	217.5	8760.6	6956.7
769	NUZIVEEDU	215.76	8930.6	4846.4
770	SREE CITY SATSEZ	219.87	7408.4	4288.3
771	BRAHMI	221.47	17914.8	15195.9
774	GARIVIDI 400KV SS 220KV BUS	214.15	18117.7	13301.3
775	URAVAKONDA 400KV SS 220KV BUS	220.4	39369.2	42702.4
776	KALIKIRI 220KV BUS	219.93	13096.2	12299
777	JAMMALAMADUGU 400KV 220 KV BUS	219.85	22580.6	19264
778	PENUGONDA	220.46	10727	10557
779	PAMPANURUTANDA	220.76	18677.2	21077.8
780	THIRUMALAYYAPALLI	219.43	15026.6	13311.1
781	BETHAMCHERLA	219.28	8055.5	7877.7
782	CHAKRYAPET	219.2	7698	7627.6

783	PORUMAMILLA	219.29	7627.3	7540
784	JAMMALAMADUGU 220KV BUS	219.53	16601.1	12441.6
785	VAJRAKARUR	220.27	29961.3	26314
786	BORAMPALLI	221.01	25207.6	26599.6
787	PFIL BULK LOAD	216.01	11111.6	6364.4
788	SHAPURAM	220.39	16610.3	9644.5
789	BOKSAMPALLI	220.37	13920.5	8036.2
790	SUBBRAYANAPALLI	220.4	10918.5	6263.9
791	ASPIRI WIND GEN 220KV BUS	219.83	30413.9	35830.5
792	N.P.KUNTA 220KV BUS	220.26	23696.4	27646.4
793	KAIDIRI	219.63	11517.9	7812.5
794	GANNAVARAM	217.07	16146.9	12198.3
797	NAIDUPET	215.87	8845	5154.6
798	DUVVA	211.46	9264.7	11269.4
799	MALKAPURAM	219.25	28424.5	20526.2
800	KAKINDA SEZ 220KV BUS	214.11	14546.3	9450.7
801	RACHERLAPADU	212.74	7152.3	3888.8
805	ELURU 220KV BUS	216.32	23644.1	21989.8
806	GARIVIDI	219.2	23641.4	18782.9
807	CHILAKALURIPETA	216.4	19167.9	12272.3
810	REPALLE	212.14	6043.6	3531.3
811	TADEPALLI	219.11	24130	15486.2
812	GANI	220.27	22171.4	24246.4
816	INAVOLU/THULLUR	219.32	29472.9	21570.2
817	ACHUTHAPURAM	217.01	13563.2	8520.9
824	TALLARICHERUVU	220.95	22830.7	23493.2
825	URAVAKONDA-2 220KV BUS	220	29577.8	33643.5
826	MYLAVARAM-2	220.69	26416.6	29193.1
951	KUNROOL 765KV	765	21098	23258.3
954	NELLORE 765KV	782.11	14962.1	13525.2
1006	AMALAPURAM	126.25	7483.1	8791.6
1007	AP CARBIDE	127.13	8483.1	6632.2
1009	ARAKU	129.53	5282.8	6432.7
1011	ANANTHAPUR	129.45	9762	9203

1015	BHIMAVARAM	123.7	7997.8	8334.9
1018	BHIMADOLE	124.85	8620.8	7397.3
1019	BOMMUR	129.09	11893.8	12039.4
1025	CUDDAPAH	126.81	8932.7	9240.2
1030	CHILLAKALLU	128.24	8201.1	8398.5
1032	CHITTOOR	131.2	8026.5	7755.7
1039	GUNADALA	130.43	10814.6	10280.4
1045	TADIKONDA	129.53	10948.8	8917.5
1047	GUNTAKALU	130.17	3770.2	4602.4
1048	GOOTY	129.09	9234.5	9178.1
1049	GARIVIDI	123.74	8946.9	8822.8
1050	GAJUWAKA	129.39	11459.3	12650.3
1051	HINDUPUR	131.2	9576.5	8300.4
1052	HAMPI 132KV BUS	132.14	2387.4	3223.2
1060	KAKINDA	127.72	7736.7	7891.9
1061	KONDAPALLI	129.34	7401.3	7431.4
1062	GOLLAPURAM	129.82	9087.4	6776.6
1066	KALIKIRI	129.26	7820.3	7752.5
1081	KAMAVARAPU KOTA 132KV BUS	125.91	8022.7	6461.7
1082	ATMAKUR	125.12	4851.4	4896.6
1088	MARCHIKANDI 132KV BUS	131.85	5093.6	6967.6
1095	NANDYALA	126.28	6755.2	4857.1
1096	NAVEL WHERF	131.18	8425	9889.8
1101	NELLORE	127.65	10904.6	10702.2
1105	NTS	127.69	4380.6	5166.7
1109	ONGOLE	121.88	7488.6	5789.1
1112	PIDUGURALLA	128.42	6175.6	5216.9
1113	PEDDAPURAM (SAMARLAKOTA)	127.6	6837.5	6910
1116	PALAMANERU	129.68	5237.5	4205.9
1117	PAMARRU	127.92	6522.7	7669.4
1120	PARCHUR	124.86	5147.8	4548.2
1122	PULIVENDULA	128.36	6187.6	5353.1
1123	NAGARI	128.03	5399.3	4174.4

1129	RENIGUNTA 132KV	125.9	8677.4	7105.9
1140	SULLURPET	133.2	6503.9	5636.7
1144	DHARMAVARAM	129.7	5551.8	4011.5
1145	SRISAIALM	130.02	6947.6	6985.2
1148	TB VARA	127.8	6652	7909.7
1150	TADIPATRI	130.44	6061.6	5172.6
1152	TEKKALI	120.1	4014.6	2837.5
1160	YERRAGUNTLA	129.13	8666.3	7874.1
1190	MACHILIPATNAM	128.17	6624.8	7542.4
1197	PENDURTHY	126.87	11436.6	12217.3
1198	KALYANDURG	137.01	7234.1	7048.8
1309	GUDIVADA	127.07	9500.9	10325.9
1312	RAJAMPETA	127.93	3114.9	2542.9
1318	NIDAVAOLU	127.53	9478.8	9097.6
1322	AMARAVATHI	128.11	8796.7	8247.4
1346	CHINAKAMPALLY	134.77	7454.3	7279.4
1356	RAZOLU	129.21	3936.1	5098.4
1373	MARKAPURAM	130.52	4955.9	3693.7
1375	RAVIKAMATAM	128.92	6196.2	7371.1
1382	VATSA	129.33	3866.5	5019.4
1385	RCL	131.58	7832.7	9308.2
1388	DAIRY FARM	128.73	10571.8	9346.2
1390	NARSARAOPET	127.3	6676.9	5960.7
1408	PARWDA	127.65	6868.8	6406
1451	KANDUKUR	120.33	5343.3	4202.4
1470	ELUR	126.64	6843.6	6460.8
1471	CHERIVI	129.25	7257.7	5972.2
1473	ADONI	128.35	6357.9	5899.2
1501	BRANDIX	126.75	5370.5	4839.4
1503	RENTACHINTALA	130.17	3421.6	3125
1512	NUNNA	129.02	7344.3	6942.8
1514	CHILAKALURIPET	125.23	4809.5	4070.2
1515	RACHAGUNNERI	128.93	6730.8	5926.8
1522	KORPROLU	126.98	5080.7	4329.8

1525	PALLANTLA	126.25	6401.7	5753.7
1527	GUNTUR	126.61	7194.5	6134.3
1528	KUPPAM	125.15	3297.5	2432.4
1540	KONDAPURAM/JAMMALAMADUGU	130.13	6272	5369.2
1542	MANUBOLU	129.45	12650.7	11563.4
1552	MADANAPALLI	132.66	5484.8	4761.1
1553	BOBBILI	124.71	7869.3	6694.3
1557	PYDHIBHIMAVARAM	124.98	6999.1	5721.6
1559	NUZIVEEDU	125.7	4572.8	3619.2
1561	PENGONDA	131.36	6856	6810
1562	PAMPANURUTANDA	131.54	8200.8	8455.4
1563	THIRUMALAYYAPALLI	130.65	8900.9	8507.6
1564	BETHAMCHERLA	130.17	6038.8	5974.2
1565	CHAKRAYAPET	130.12	5913.5	5884.6
1566	PORUMAMILLA	130.17	5888.9	5853.8
1567	JAMMALAMADUGU 132KV BUS	130.61	9208.5	8283.4
1568	VAJRAKARUR	131.06	6093.8	5992.5
1569	BORMAPALLI	131.92	8830.3	8928.9
1573	GANNAVARAM	126.51	5346.4	5029.2
1576	NAIDUPET	125.77	4558.7	3715.7
1577	DUVVA	123.62	5960.1	6427.8
1578	MALKAPURAM	130.39	6028.4	5747.2
1579	KAKINDA SEZ	124.2	6952.8	5998.3
1580	PODILI	126.36	3039.2	2964.8
1581	RACHERLAPADU	125.29	4249.8	3265.2
1585	KAIDIRI	129.5	5034.6	4473.6
1586	BOKSAMPALLI	131.86	3039.4	2776.5
1588	MUTYALACHERUVU	131.06	4171.9	3269.5
1589	REPALLE	123.45	3930.7	3058.1
1592	TADEPALLI	127.78	5776.9	5341.2
1593	ACHUTHAPURAM	126.47	5140.9	4520.2

TentativeTransmission Network Expansion From FY2019-20 to FY2023-24
Yearwise No. of Substations, Lines in ckm(220KV and above)

FY	2019-20	2020-21	2021-22	2022-23	2023-24	Total
400KV						
Substation No.	0	3	1	1	1	6
COST (IN LAKHS)	0	37143	12381	12381	12381	74286
220KV						
Substation No.	2	2	4	3	9	20
COST(in Lakhs)	7138	7138	14276	10707	32121	71380
400KV						
LINE CKM	0	174	742	400	440	1756
COST(in Lakhs)	0	20714	86135	48000	52800	207649
220KV						
LINE CKM	60	200	220	150	420	1050
COST(in Lakhs)	3660	12200	13420	9150	25620	64050
TOTAL SS&LINE COST(in Rs. Crs)	**107.98**	**771.95**	**1262.12**	**802.38**	**1229.22**	**4173.65**

FY	2020	2021	2022	2023	2024	2020-24
Total Investments for 132 KV (Rs Crores)	**975.25**	**1033.24**	**528.27**	**432.83**	**829.00**	**3798.59**

Total Investment in Rs. Crores

FY	2019-20	2020-21	2021-22	2022-23	2023-24	Total
132 KV	975.25	1033.24	528.27	432.83	829.00	3798.59
220 KV	107.98	193.38	276.96	198.57	577.41	1354.30
400 KV	0.00	578.57	985.16	603.81	651.81	2819.35
Total	**1083.23**	**1805.19**	**1790.39**	**1235.21**	**2058.22**	**7972.24**

DURING FY 2020-2024
SUB-STATIONS (220 KV AND ABOVE)

SL.NO	DISTRICT	KV	NAME OF THE SUBSTATION	COST OF SS	TARGET YR OF COMMISSIONING
1	VISAKHAPATNAM	400/220	KORUPROLU	12381	2020-21
2	NELLORE	400/220	NELLORE POOLING STATION(AP)	12381	2020-21
3	W.GODAVARI	400/220	NIDADAVOLU 400KV SS	12381	2020-21
4	SRIKAKULAM	400/220	TEKKALI 400KV SS	12381	2021-22
5	ANANTHAPUR	400/220	KANAGANAPALLI	12381	2022-23
6	VISAKHAPATNAM	400/220	ACHUTAPURAM	12381	2023-24
1	PRAKASHAM	220/132	KANIGIRI	3569	2019-20
2	VIZIANAGARAM	220/132	VIZIANAGARAM	3569	2019-20
3	NELLORE	220/132	KAVALI	3569	2020-21
4	GUNTUR	220/132	BAPATLA	3569	2020-21
5	E.GODAVARI	220/132	PRATTIPADU	3569	2021-22
6	SRIKAKULAM	220/132	PALAKONDA	3569	2021-22
7	KURNOOL	220/132	DHONE 132KV FEATURES	3569	2021-22
8	VISAKHAPATNAM	220/132	ANANDAPURAM	3569	2021-22
9	E.GODAVARI	220/132	EDITHA	3569	2022-23
10	W.GODAVARI	220/132	TANUKU	3569	2022-23
11	GUNTUR	220/132	NAGARJUNA UNIVERSITY	3569	2022-23
12	KURNOOL	220/132	BANAGANAPALLI	3569	2023-24
13	KRISHNA	220/132	GUNADALA EXTN	3569	2023-24
14	YSR KADAPA	220/132	RAYACHOTI	3569	2023-24
15	CHITTOR	220/132	GURRAMKONDA	3569	2023-24
16	NELLORE	220/132	PODALAKURU	3569	2023-24

17	NELLORE	220/132	SARVEPALLI	3569	2023-24
18	VISAKHAPATNAM	220/132	SIMHACHALAM	3569	2023-24
19	VISAKHAPATNAM	220/132	UPGRADATION OF 220kV ANRAK SWITCHING STATION TO SUBSTATION	3569	2023-24
20	VISAKHAPATNAM	220/132	COMMOM POINT	3569	2023-24

LIST OF 132kV SS PROPOSED DURING FY 2020-2024						
Sl. No	**District**	**Name of the SS**	**No. of Transformers**	**MVA**	**Estimated cost Rs. Lakhs**	**Target year of Commissioning**
1	Anantapur	Palasamudram	2	81.5	1713	2019-20
2	Krishna	Bantumilli	2	63	1658	2019-20
3	Chittoor	Mangalam	2	63	1658	2019-20
4	Nellore	Gottiprolu	2	63	1658	2019-20
5	Guntur	GIS SS Peddaparimi	2	100	3100	2019-20
6	Guntur	GIS SS Navvuluru	2	100	3100	2019-20
7	East Godavari	Vepakayaladibba	2	47.5	1432	2019-20
8	West Godavari	Akiveedu	2	47.5	1432	2019-20
9	Visakhapatnam	APMTZ, Nadupuru	2	47.5	1432	2019-20
10	Vizianagaram	Alamanda	2	47.5	1432	2019-20
11	West Godavari	Vatluru/Hanuman Junction	2	47.5	1432	2019-20
12	West Godavari	TR Palem/Gunnampalli	2	47.5	1432	2019-20
13	West Godavari	AttiliI (Pippara)	2	47.5	1432	2019-20
14	West Godavari	Palakollu	2	47.5	1432	2019-20
15	West Godavari	Dharmajigudem	2	47.5	1432	2019-20
16	Srikakulam	Veeraghattam	2	47.5	1432	2019-20
17	Srikakulam	Sarubujjili (Amadalavalasa)	2	47.5	1432	2019-20
18	Kurnool	33kV features at Nansuralla LIS SS	2	47.5	1432	2019-20
19	Guntur	GIS SS Uddadrayanipalem	2	100	3100	2020-21
20	Guntur	GIS SS Krishnayanipalem	2	100	3100	2020-21
21	East Godavari	Annavaram	2	47.5	1432	2020-21
22	Prakasam	Chinnaganjam	2	47.5	1432	2020-21
23	Krishna	Gunadala	2	47.5	1432	2020-21
24	Krishna	Mukthyala	2	47.5	1432	2020-21
25	Krishna	Gampalagudem	2	47.5	1432	2020-21
26	Krishna	Vuyyuru	2	47.5	1432	2020-21
27	Prakasam	Kothapatnam	2	47.5	1432	2020-21
28	Prakasam	Pallamalli	2	47.5	1432	2020-21
29	Prakasam	Singarayakonda	2	47.5	1432	2020-21
30	Prakasam	Mekalavaripalli	2	47.5	1432	2020-21
31	Prakasam	Ulavapadu	2	47.5	1432	2020-21
32	Prakasam	Pullalacheruvu	2	47.5	1432	2020-21
33	Prakasam	Komarole	2	47.5	1432	2020-21

34	Prakasam	Elchuru (V), Santhamaguluru (M)	2	47.5	1432	2020-21
35	Prakasam	Siddannapalem (V), Pullalacheruvu (M)	2	47.5	1432	2020-21
36	Kurnool	Near Ayyaluri Metta (Nandyal)	2	47.5	1432	2020-21
37	Chittoor	Kakalamitta	2	47.5	1432	2020-21
38	Chittoor	Gudipadu	2	47.5	1432	2020-21
39	Chittoor	Vijalapuram	2	47.5	1432	2020-21
40	Kurnool	Gondiparla(E.Thandrapadu)	2	47.5	1432	2020-21
41	Srikakulam	Sompeta	2	47.5	1432	2020-21
42	Srikakulam	Hiramandalam	2	47.5	1432	2020-21
43	Krishna	Kabela	2	47.5	1432	2020-21
44	Vizianagaram	Chipurupalli	2	47.5	1432	2020-21
45	Vizianagaram	Nellimarla	2	47.5	1432	2020-21
46	Vizianagaram	GajapathiNagaram	2	47.5	1432	2020-21
47	Guntur	Nekarikallu	2	47.5	1432	2020-21
48	Kurnool	Kosgi	2	47.5	1432	2020-21
49	Krishna	Devanakonda	2	47.5	1432	2021-22
50	Krishna	Kalluru	2	47.5	1432	2021-22
51	Chittoor	Gandhipuram	2	47.5	1432	2021-22
52	Kurnool	Gajulapalli	2	47.5	1432	2021-22
53	Anantapur	Kuderu	2	47.5	1432	2021-22
54	Guntur	Bhattiprolu	2	47.5	1432	2021-22
55	Guntur	Bellamkonda	2	47.5	1432	2021-22
56	Kurnool	33kV features at Krishnagiri LIS SS	2	47.5	1432	2021-22
57	Chittoor	Satyavedu	2	47.5	1432	2021-22
58	Chittoor	Poothalapattu	2	47.5	1432	2021-22
59	Chittoor	BN Kandriga	2	47.5	1432	2021-22
60	Prakasam	Kaligiri	2	47.5	1432	2021-22
61	Prakasam	Veligandla	2	47.5	1432	2021-22
62	Prakasam	Ponnaluru	2	47.5	1432	2021-22
63	Krishna	Penamaluru	2	47.5	1432	2021-22
64	Krishna	Kankipadu	2	47.5	1432	2021-22
65	Krishna	Challapalle	2	47.5	1432	2021-22
66	Srikakulam	Gara	2	47.5	1432	2021-22
67	Srikakulam	Polaki	2	47.5	1432	2021-22
68	Srikakulam	Vajrapukothuru	2	47.5	1432	2021-22
69	Vizianagaram	Pusapathirega	2	47.5	1432	2022-23
70	Vizianagaram	Kurupam	2	47.5	1432	2022-23
71	Vizianagaram	Mentada	2	47.5	1432	2022-23
72	Nellore	Duttalur	2	47.5	1432	2022-23
73	Nellore	Buchireddypalem	2	47.5	1432	2022-23
74	Nellore	Somasila	2	47.5	1432	2022-23

75	Nellore	Dakkili	2	47.5	1432	2022-23
76	Nellore	Jonnawada	2	47.5	1432	2022-23
77	Nellore	Vidavaluru	2	47.5	1432	2022-23
78	Visakhapatnam	Madugula	2	47.5	1432	2022-23
79	Visakhapatnam	Sabbavaram	2	47.5	1432	2022-23
80	Visakhapatnam	Nathavaram	2	47.5	1432	2022-23
81	West Godavari	Unguturu	2	47.5	1432	2022-23
82	West Godavari	Undrajavaram	2	47.5	1432	2022-23
83	West Godavari	Veeravasarevu	2	47.5	1432	2022-23
84	Guntur	Peddakakani	2	47.5	1432	2022-23
85	Guntur	Gurazala	2	47.5	1432	2022-23
86	Guntur	Edlapadu	2	47.5	1432	2022-23
87	YSR Kadapa	Galiveedu	2	47.5	1432	2022-23
88	YSR Kadapa	Nandaluru	2	47.5	1432	2022-23
89	YSR Kadapa	Pullampeta	2	47.5	1432	2022-23
90	YSR Kadapa	Lakkireddipalle	2	47.5	1432	2022-23
91	Kurnool	Jupadu	2	47.5	1432	2023-24
92	Kurnool	Miduthur	2	47.5	1432	2023-24
93	Kurnool	Chagalamarri	2	47.5	1432	2023-24
94	Nellore	Mallam	2	47.5	1432	2023-24
95	Nellore	Varagali	2	47.5	1432	2023-24
96	Vizianagaram	Govada	2	47.5	1432	2023-24
97	Visakhapatnam	K.Kotapadu	2	47.5	1432	2023-24
98	Visakhapatnam	Vaddadhi	2	47.5	1432	2023-24
99	Visakhapatnam	Bhimili	2	47.5	1432	2023-24
100	Visakhapatnam	Rambili (Lalam Koduru)	2	47.5	1432	2023-24
101	Visakhapatnam	NSTL	2	47.5	1432	2023-24
102	Visakhapatnam	Auto Nagar	2	47.5	1432	2023-24
103	Visakhapatnam	East Point Colony	2	47.5	1432	2023-24
104	East Godavari	Hamsavaram	2	47.5	1432	2023-24
105	East Godavari	Panasapadu, Kakinada rural	2	47.5	1432	2023-24
106	East Godavari	Teki	2	47.5	1432	2023-24
107	East Godavari	Uppalaguptam	2	47.5	1432	2023-24
108	East Godavari	Mamidikuduru	2	47.5	1432	2023-24
109	East Godavari	Gokavaram	2	47.5	1432	2023-24
110	East Godavari	Dwarapudi or Mukkinada	2	47.5	1432	2023-24
111	East Godavari	Atreyapuram	2	47.5	1432	2023-24
112	East Godavari	Addathigala	2	47.5	1432	2023-24

TENTATIVE TRANSMISSION EXPANSION PROGRAMME

FOR THE PERIOD FY 2019-20 TO FY 2023-24

TRANSMISSION LINES (220 KV AND ABOVE)

All amounts in Rs. lakhs

SL.NO	Voltage Level KV	Name of the Transmission Line	CKT	COND TYPE	Length (RKM)	Estt. Cost PER KM	LINE COST	Length in Ckt KM	Target year of commissioning
1	400KV	PROPOSED PUDIMADAKA 765/400KV TO PROPOSED KORUPROLU (PUDIMADAKA) 400KV SS	D/C	QUAD MOOSE	45	240	10800	90	2020-21
2	400KV	POLAVARAM HEP TO PROPOSED NIDADAVOLU 400KV SS	D/C	TWIN MOOSE	2	157	314	4	2020-21
3	400KV	NELLORE POOLING STATION PGCIL TO PROPOSED NELLORE POOLING STATION AP	D/C	QUAD MOOSE	10	240	2400	20	2020-21
4	400KV	POLAKI 765/400KV SS TO TEKKALI 400/220KV SS	D/C	QUAD MOOSE	30	240	7200	60	2020-21
5	400KV	POLAKI 765/400KV SS TO GARIVIDI 400/220KV SS	D/C	QUAD MOOSE	90	240	21600	180	2021-22
6	400KV	PALASA 765/400KV SS(PGCIL) TO TEKKALI 400/220KV SS	D/C	QUAD MOOSE	60	240	14400	120	2021-22
7	400KV	KALAPAKA 400KV SS TO KORUPROLU 400KVSS	D/C	TWIN MOOSE	35	157	5495	70	2021-22
8	400KV	ITCHAPURAM COAL PLANT GEN 400KV TO PROPOSED TEKKALI 400KV SS	D/C	QUAD MOOSE	70	240	16800	140	2021-22
9	400KV	LILO OF 400KV URAVAKONDA TO JAMMALAMADUGU LINE TO PROPOSED KANAGANAPALLI 400KV SS	D/C	QUAD MOOSE	116	240	27840	232	2021-22

10	400KV	EASTCOAST TPP(GEN) TO PROPOSED GARIVIDI 400KV SS	D/C	QUAD MOOSE	200	240	48000	400	2022-23
11	400KV	PUDIMADAKA TPS TO KV KOTA 400KV SS	D/C	QUAD MOOSE	220	240	52800	440	2023-24
12	220KV	PROPOSED PODILI 400KV SS TO PROPOSED KANIGIRI(PRKSM) 220KV SS	D/C	SINGLE MOOSE	30	122	3660	60	2019-20
13	220KV	LILO OF VTS-TALLAPALLI CKT2 TO PROPOSED TADEPALLI 220KV SS	D/C	SINGLE MOOSE	10	122	1220	20	2020-21
14	220KV	MANUBOLU 400KV SS TO PROPOSED KAVALI 220KV SS	D/C	SINGLE MOOSE	90	122	10980	180	2020-21
15	220KV	KORUPROLU 400KV SS TO PROPOSED PRATTIPADU 220KV SS	D/C	SINGLE MOOSE	35	122	4270	70	2021-22
16	220KV	BOBBILI TO PROPOSED PALAKONDA SS	D/C	SINGLE MOOSE	37.5	122	4575	75	2021-22
17	220KV	TEKKALI 400KV SS TO PROPOSED PALAKONDA SS	D/C	SINGLE MOOSE	37.5	122	4575	75	2021-22
18	220KV	VEMAGIRI 400KV SS TO PROPOSED EDITHA 220KV SS	D/C	SINGLE MOOSE	20	122	2440	40	2022-23
19	220KV	NIDADAVOLU 400KV SS TO PROPOSED TANUKU 220KV SS	D/C	SINGLE MOOSE	30	122	3660	60	2022-23
20	220KV	SATTENAPALLI 400KV SS TO PROPOSED PIDUGURALLA SS	D/C	SINGLE MOOSE	25	122	3050	50	2022-23
21	220KV	GARIVIDI 400KV SS TO PROPOSED VIZIANAGARAM 220KV SS	D/C	SINGLE MOOSE	42.5	122	5185	85	2023-24
22	220KV	PANYAM (GANI) 400KV SS TO PROPOSED BANAGANAPALLI 220KV SS	D/C	SINGLE MOOSE	20	122	2440	40	2023-24
23	220KV	GUNADALA 220KV SS TO PROPOSED GUNADALA EXTN 220KV	D/C	SINGLE MOOSE	5	122	610	10	2023-24

24	220KV	CHILAKALURIPETA 400KV SS TO PROPOSED BAPATLA SS	D/C	SINGLE MOOSE	40	122	4880	80	2023-24
25	220KV	400kV KALIKIRI TO 220kV SS RAYACHOTI	D/C	SINGLE MOOSE	12.5	122	1525	25	2023-24
26	220KV	220kV DIARY FARM TO PROPOSED 220kV NSTL	D/C	SINGLE MOOSE	22.5	122	2745	45	2023-24
27	220KV	400kV KALIKIRI TO 220kV SS GURRAMKONDA	D/C	SINGLE MOOSE	20	122	2440	40	2023-24
28	220KV	220kV SS NELLORE TO 220kV SS PODALAKURU	D/C	SINGLE MOOSE	20	122	2440	40	2023-24
29	220KV	400kV MANUBOLU TO 220kV SS SARVEPALLI	D/C	SINGLE MOOSE	12.5	122	1525	25	2023-24
30	220KV	KALPAKA - BRANDIX CKT 1 LILO TO SIMHACHALAM	D/C	SINGLE MOOSE	2.5	122	305	5	2023-24
31	220KV	220kV DIARY FARM TO PROPOSED 220kV ANANDAPURAM	D/C	SINGLE MOOSE	7.5	122	915	15	2023-24
32	220KV	220kV GAJUWAKA TO COMMON POINT	D/C	SINGLE MOOSE	5	122	610	10	2023-24

LIST OF 132kV LINES PROPOSED DURING FY 2020-2024					
Sl. No	**Name of Transmission line**	**Length in Ckt KM**	**Estimated cost Rs. Lakhs**	**Target year of Commissioning**	**Present status of implementation/ Criticalities if any**
1	Stringing of 2nd circuit on existing 132kV DC/SC Line from 220/132kV SS Gudivada to 132kV SS Chigurukota	23.00	2344.42	2019-20	Tenders not called
2	132kV DC line from 132kV SS Chigurukota to the proposed 132/33kV SS Bantumilli	18.00			
3	132kV DC line from 220/132kV SS Rachagunneri to the proposed 132/33kV SS Mangalam	30.00	2905.6	2019-20	Tenders not called
4	132kV DC line from proposed 220/132kV SS Naidupet to the proposed 132/33kV SS Gottiprolu	30.00	2905.6	2019-20	Tenders not called
5	132kV LILO of existing 132kV Kanumolu - Pamarru at proposed 400/220/132kV SS Gudiwada	4.00	500	2019-20	TOO issued
6	132kV LILO of existing 132kV Chilakaluripet - Nallapadu at proposed 220/132kV SS Chilakaluripet	10.50	1200	2019-20	TOO issued
7	132kV LILO of existing 132kV Chilakaluripet - Marripalem at proposed 220/132kV SS Chilakaluripet	10.50	1200	2019-20	TOO issued
8	132kV DC/SC Line with XLPE UG Cable from proposed 220/132/33kV SS Amaravati to the proposed 132/33kV SS Peddaparimi	19.00	15516	2019-20	TOO to be issued
9	132kV DC/SC Line with XLPE UG Cable from proposed 220/132/33kV SS Malkapuram to the proposed 132/33kV SS Navuluru	12.00	9900	2019-20	TOO to be issued
10	132kV DC/SC Line with XLPE UG Cable from proposed 132/33kV SS Peddaparimi to the proposed 132/33kV SS Navuluru	16.00	13070	2019-20	TOO to be issued

11	132kV DC/SC Line from 220/132kV SS Brandix to the proposed 132/33kV Substation APMTZ	30.00	3018.7	2019-20	TOO to be issued
12	132kV DC Line by making LILO of 132kV Gajuwaka – Parawada line at proposed 132kV SS APMTZ	3.00			
13	220kV SS Bommur to 132kV SS Vepakayaladibba	7.00	1000	2019-20	TOO to be issued
14	220kV SS Undi to 132kV SS Akiveedu	15.00	1600	2019-20	System studies to be furnished
15	220kV SS Kamavarapukota to 132kV SS Dharmajigudem	25.00	2469	2019-20	System studies to be furnished
16	220kV SS Undi to 132kV SS Attili	25	2469	2019-20	System studies to be furnished
17	132kV SS Razole to 132kV SS Palakollu	20	2028	2019-20	System studies to be furnished
18	132kV SS Rajam to 132kV SS Veeraghattam	35	3300	2019-20	System studies to be furnished
19	132kV SS Palakonda to 132kV SS Sarubujjili	20	2028	2019-20	System studies to be furnished
20	132kV DC/SC Line with XLPE UG Cable from proposed 220/132/33kV SS Malkapuram to the proposed 132/33kV SS Uddandrayanipalem	3.00	2687	2020-21	TOO to be issued
21	132kV DC/SC Line with XLPE UG Cable from proposed 132/33kV SS Dondapadu to the proposed 132/33kV SS Uddandrayanipalem	7.00	5860	2020-21	TOO to be issued
22	132kV DC/SC Line with XLPE UG Cable from proposed 220/132/33kV SS Malkapuram to the proposed 132/33kV SS Krishnayanipalem	6.00	5075	2020-21	TOO to be issued
23	132kV DC/SC Line with XLPE UG Cable from proposed 132/33kV SS Navuluru to the proposed 132/33kV SS	3.00	2650	2020-21	TOO to be issued

	Krishnayanipalem				
24	132kV SS Pithapuram to 132kV SS Annavaram	30	2905	2020-21	System studies to be furnished
25	220kV SS Garividi to 132kV SS Nelimarla	30	2905	2020-21	System studies to be furnished
26	220kV SS Kondapalli to 132kV SS Kabela	25	2469	2020-21	System studies to be furnished
27	132kV SS Palasa to 132kV SS Sompeta	35	3300	2020-21	System studies to be furnished
28	220kV SS Garividi to 132kV SS Chipurupalli	10	1200	2020-21	System studies to be furnished
29	132kV TB Vara - 220kV Garividi LILO to Gajapathinagaram	36	3422	2020-21	System studies to be furnished
30	220kV SS Kandukur to 132kV SS Singarayakonda	30	2905	2020-21	System studies to be furnished
31	Proposed 132kV SS Chinnarikatla to 132kV SS Mekalavaripalli	25	2469	2020-21	System studies to be furnished
32	220kV SS Ongole to 132kV SS Kothapatnam	30	2905	2020-21	System studies to be furnished
33	proposed 132kV SS Kalasapadu to 132kV SS Komarole	30	2905	2020-21	System studies to be furnished

34	220kV SS Gunadala to 132kV SS Gunadala	25	2469	2020-21	System studies to be furnished
35	220kV SS Chillakallu to 132kV SS Mukthyala	30	2905	2020-21	System studies to be furnished
36	From LILO of 132kV Kondapalli-Nuzividu line to 132kV SS Gampalagudem	40	3500	2020-21	System studies to be furnished
37	132kV SS Irala to 132kV SS Kakalamitta	20	2028	2020-21	System studies to be furnished
38	132kV SS Shanthipuram to 132kV SS Vijalapuram	25	2469	2020-21	System studies to be furnished
39	132kV Renigunta-Chandragiri line LILO to 132kV SS Gandhipuram	5	700	2021-22	System studies to be furnished
40	132kV SS Kesinenipalli to 132kV SS Pullalacheruvu	35	3300	2021-22	System studies to be furnished
41	132kV Nandyala-Allagadda LILO to 132kV SS Gajulapalli	20	2028	2021-22	System studies to be furnished
42	220kV SS Cherivi to 132kV SS Satyavedu	24	2460	2021-22	System studies to be furnished
43	132kV SS Penumur to 132kV SS Poothalapattu	20	2028	2021-22	System studies to be furnished
44	220kV SS Atmakuru to 132kV SS Kaligiri	30	2905	2021-22	System studies to be furnished

45	132kV SS Repalle to Bhattiprolu	17	1800	2021-22	System studies to be furnished
46	132kV SS Piduguralla to Bellamkonda	19	2000	2021-22	System studies to be furnished
47	132kV SS Kanigiri to Veligandla	26	2469	2021-22	System studies to be furnished
48	220kV SS Kandukuru to Ponnaluru	20	2028	2021-22	System studies to be furnished
49	220kV SS Rachagunneri to BN Kandriga	25	2469	2021-22	System studies to be furnished
50	132kV SS Vinjamuru to 132kV SS Duttaluru	30	2905	2022-23	System studies to be furnished
51	132kV SS NTS to 132kV SS Buchireddypalem	10	1200	2022-23	System studies to be furnished
52	132kV SS Rapur to 132kV SS Somasila	25	2469	2022-23	System studies to be furnished
53	132kV SS Rapur to 132kV SS Dakkili	30	2905	2022-23	System studies to be furnished
54	132kV Nellore - Atmakuru LILO to 132kV SS Jonnawada	5	700	2022-23	System studies to be furnished
55	220kV SS Racharlapadu to 132kV SS Vidavalur	15	1600	2022-23	System studies to be furnished

56	220kV SS Meenakuru to 132kV SS Mallam	40	3500	2023-24	System studies to be furnished
57	220kV SS Manubolu to 132kV SS Varagali	20	2028	2023-24	System studies to be furnished
58	132kV SS Chodavaram to 132kV SS K.Kotapadu	10	1200	2023-24	System studies to be furnished
59	Kasimkota - Pendurthy LILO to Govada	15	1600	2023-24	System studies to be furnished
60	Anrak SS to 132kV SS Vaddadhi	20	2028	2023-24	System studies to be furnished
61	132kV SS Kapuluppada to 132kV SS Bhimili	15	1600	2023-24	System studies to be furnished
62	Brandix to 132kV SS Rambili	15	1600	2023-24	System studies to be furnished
63	Dairy Farm to 132kV SS NSTL	10	1200	2023-24	System studies to be furnished
64	Gajuwaka to 132kV SS Auto nagar	10	1200	2023-24	System studies to be furnished
65	Peddawaltair to East Point colony	5	700	2023-24	System studies to be furnished
66	Proposed 220kV SEZ SS to Hamsavaram	25	2469	2023-24	System studies to be furnished

67	Proposed 220kV SS Gollaprolu to Hamsavaram	30	2905	2023-24	System studies to be furnished
68	Proposed 220kV SS Prathipadu to Hamsavaram	40	3500	2023-24	System studies to be furnished
69	LILO of 132kV Kakinada - Peddapuram line to Panasapadu	2	2500	2023-24	System studies to be furnished
70	Proposed 220kV Ramachandrapuram to Teki	15	1600	2023-24	System studies to be furnished
71	Proposed 132kV SS Mummidivaram to Uppalaguptam	15	1600	2023-24	System studies to be furnished
72	LILO of 132kV Amalapuram-Razolu line to Mamidikuduru	3	2650	2023-24	System studies to be furnished
73	Proposed 220kV SS Korukonda to Gokavaram	10	1200	2023-24	System studies to be furnished
74	132kV SS Biccavolu to Dwarapudi or Mukkinada	12	1400	2023-24	System studies to be furnished
75	Proposed 220kV Ramachandrapuram to Dwarapudi or Mukkinada	20	2028	2023-24	System studies to be furnished
76	220kV SS Nidadavolu to Atreyapuram	20	2028	2023-24	System studies to be furnished
77	132kV LILO of Bommuru-Nidadavolu to Atreyapuram	15	1600	2023-24	System studies to be furnished

78	Proposed 132kV SS Gokavaram to Addathigala	35	3300	2023-24	System studies to be furnished
79	Proposed 132kV SS Jaggampeta to Addathigala	40	3500	2023-24	System studies to be furnished
80	132kV SS Palakonda to Hiramandalam	23	2460	2023-24	System studies to be furnished

DISTRICTS IN A.P

DISTRICT NAME	ZONE/DIST
Srikakulam	1
Vizianagaram	2
Visakhapatnam	3
East Godavari	4
West Godavari	5
Krishna	6
Guntur	7
Prakasam	8
Nellore	9
Chittoor	10
Cuddapah	11
Anantapur	12
Kumool	13

DETAILS OF BUS ID WITH FULL NAME , ZONE AND VOLTAGE LEVEL

BUS ID	EXTRA ID	ZONE	VOLTAGE LEVEL	NAME OF THE BUS
764	ABFL	3	220	ABFL BULK LOAD
1593	ACHPRM	3	132	ACHUTHAPURAM
817	ACHPRM	3	220	ACHUTHAPURAM
523	ACHTPM	3	400	ACHUTHAPURAM 400KV
1473	ADONI	13	132	ADONI
607	ADONI	13	220	ADOINI
1006	AMLP	4	132	AMALAPURAM
333	AMLP	4	220	AMALAPURAM
1322	AMRVT	7	132	AMARAVATHI
338	AMRVT	7	220	AMARAVATHI
1594	ANDPRM	3	132	ANADAPURAM
818	ANDPRM	3	220	ANADAPURAM
692	APAR-PK	9	220	APAR - PARK
1007	APC	13	132	AP CARBIDE
201	APC	13	220	APCARBIDES
763	APPYA	2	220	ADRPALEM
1009	ARK	3	132	ARAKU
9803	ASPGN1	13	15.75	ASPIRI GEN-1
9808	ASPGN2	13	15.75	ASPIRI GEN-2
9809	ASPGN3	13	15.75	ASPIRI GEN-3
9810	ASPGN4	13	15.75	ASPIRI GEN-4
9811	ASPGN5	13	15.75	ASPIRI GEN-5
558	ASPRI	13	400	ASPIRI WIND GEN 400KV BUS
791	ASPRI	13	220	ASPIRI WIND GEN 220KV BUS
1082	ATMKR	9	132	ATMAKUR
377	ATMKR	9	220	ATMAKUR
1011	ATP	12	132	ANANTHAPUR
258	ATP	12	220	ANANTHAPUR
7013	ATPBN	70	400	ANATHAPUR BN (ISTS)
1595	AUTNGR	6	132	AUTO NAGAR

819	AUTNGR	6	220	AUTO NAGAR
1553	BBL	2	132	BOBBILI
724	BBL	2	220	BOBBILI
765	BECL	3	220	BECL BULK LOAD
278	BGSM	12	220	BOGASAMUDRAM
1015	BHMV	5	132	BHIMAVARAM
327	BHMV	5	220	BHIMAVARAM
623	BKKTR-LI	13	220	B.K.KOTHUR
1586	BKSMPL	12	132	BOKSAMPALLI
789	BKSPL	12	220	BOKSAMPALLI
7039	BKTR-WNP	70	220	B.K. KOTHUR WANAPARTHY (ISTS)
1018	BMDL	5	132	BHIMADOLE
202	BMDL	5	220	BHIMADOLE
762	BMPP	4	220	BMPP - RELIANCE
9157	BMPP	4	15.75	BARGE MOUNTED POWER PLANT
1019	BMR	4	132	BOMMUR
203	BMR	4	220	BOMMUR
1587	BNGPLI	13	132	BANAGANAPALLI
809	BNGPLI	13	220	BANAGANAPALLI
1569	BORMPL	12	132	BORMAPALLI
786	BORMPL	12	220	BORAMPALLI
324	BOYA	12	220	BOGASAMUDRAM
7014	BPRAI	70	400	BOOTHPUR RAYAPUR
771	BRHMI	11	220	BRAHMI
1501	BRNDX	3	132	BRANDIX
643	BRNDX	3	220	BRANDIX
307	BSES	4	220	RELIANCE
9185	BSES	4	15	RELIANCE
9186	BSES	4	11.5	RELIANCE
1564	BTMCRL	11	132	BETHAMCHERLA
781	BTMCRL	11	220	BETHAMCHERLA
1025	CDP	11	132	CUDDAPAH
204	CDP	11	220	KADAPA
7040	CHKL-WGL	70	765	CHILAKALURIPETA - WARANGAL (ISTS)

1565	CHKRPT	11	132	CHAKRAYAPET
782	CHKRPT	11	220	CHAKRYAPET
734	CHLKPT	7	220	CHILAKALURIPETA 400KV 220KV BUS
545	CHLKPT(AP)	7	400	CHILAKALURIPETA 400KV AP
526	CHLKPT(PG)	7	400	CHILAKALURIPET (PGCIL 400KV)
807	CHLKPT2(AP)	7	220	CHILAKALURIPETA
953	CHLKPT7	7	765	CHILAKALURIPETA 765KV
1471	CHRVI	10	132	CHERIVI
606	CHRVI	10	220	CHERIVI
276	CKL	6	220	CHILLAKALLU
7018	CKL-NRK	70	220	CHILAKALLU - NARKETPALLI (ISTS)
1030	CLKL	6	132	CHILLAKALLU
1514	CLKPT	7	132	CHILAKALURIPET
1346	CNP	11	132	CHINAKAMPALLY
206	CNP	11	220	CHINAKAMPALLY
401	CNP	11	400	CHINAKAMPALLY
7005	CNP-KO	70	400	CHINAKAMPALLY - KOLAR (ISTS)
1032	CTR	10	132	CHITTOOR
207	CTR	10	220	CHITTOOR
6004	CTR2-TV	70	220	CHITTOOR - TIRUVELAM (ISTS)
421	CTR4	10	400	CHITTOOR
7006	CTR-MD(SRPD)	70	400	CHITTOOR - SRI PERUMBUDUR (ISTS)
318	CTRN	10	220	CHITTOOR 400KV 220KV BUS
7017	CTR-TV	70	400	CHITTOOR - TIRUVELAM (ISTS)
1388	DFARM	3	132	DAIRY FARM
326	DFARM	3	220	DAIRY FARM
1144	DHMVR	12	132	DHARMAVARAM
357	DHMVR	12	220	DHARAMAVARAM
1516	DHONE	13	132	DHONE
657	DHONE	13	220	DHONE
208	DNK	4	220	DONKARAI
9110	DNK	4	11	DONKARAI
1577	DUVVA	5	132	DUVVA
798	DUVVA	5	220	DUVVA

9160	EAST-GEN1	1	15.75	EAST COST GEN-1
9161	EAST-GEN2	1	15.75	EAST COST GEN-2
1524	EDITA	4	132	EDITA
664	EDITA	4	220	EDITA
1470	ELR	5	132	ELUR
561	ELR	5	400	ELURU
605	ELR	5	220	ELURU 400KV SS 220 KV BUS
805	ELR2	5	220	ELURU 220KV BUS
961	ELR765	5	765	ELURU 765KV
482	EPS	4	400	EPS
9400	EPS	4	15.75	EPS GEN-1
9401	EPS	4	15.75	EPS GEN-2
9402	EPS	4	15.75	EPS GEN-3
689	GADDA	11	220	GADDAMVARIPALLI
663	GAIL	4	220	GAIL
563	GANI(PNYM)	13	400	PANYAM
812	GANI(PNYM)	13	220	GANI
9815	GANIG1	13	11	GANI GEN-1
9816	GANIG2	13	11	GANI GEN-2
481	GAUT	4	400	GAUTAMI
9175	GAUT	4	15.75	GAUTAMI GEN-1
9176	GAUT	4	15.75	GAUTAMI GEN-2
9177	GAUT	4	15.75	GAUTAMI GEN-3
209	GDL	6	220	GUNADALA
690	GDMARRI	11	220	GODDUMARRI
1309	GDV	6	132	GUDIVADA
293	GDV	6	220	GUDIVADA
562	GDV	6	400	GUDIVADA
806	GDV2	6	220	GARIVIDI
9806	GLVDG1	12	11	GALIVEEDU GEN-1
9807	GLVDN2	12	11	GALIVEEDU GEN-2
560	GLVDU	12	400	GALIVEEDU 400KV BUS
417	GMR(VMG)	4	400	GMR(VMG)
9155	GMR1	4	15.75	GMR (VEMAGIRI) GEN-1

9156	GMR2	4	15.75	GMR (VEMAGIRI) GEN-2
1039	GNDL	6	132	GUNADALA
615	GNGVM	3	220	GANGAVARAM
1527	GNTR	7	132	GUNTUR
667	GNTR	7	220	GUNTUR
725	GNTYD	2	220	GANTYADA
1573	GNVRM	6	132	GANNAVARAM
794	GNVRM	6	220	GANNAVARAM
1062	GOLPRM	12	132	GOLLAPURAM
368	GOLPRM	12	220	GOLLAPURAM
1047	GTKL	12	132	GUNTAKALU
238	GTN	12	220	GOOTY
405	GTN	12	400	GOOTYNEW 400 KV
7004	GTN-BN	70	400	GOOTY - BANGALORE (ISTS)
7003	GTN-NM	70	400	GOOTY - NEELMANGALA (ISTS)
7011	GTN-RAI	70	400	GOOTY - RAICHOOR (ISTS)
9184	GTS-EG5	4	11	GTS GEN
680	GT-STN	4	220	GTS 220KV
1048	GTY	12	132	GOOTY
212	GTY	12	220	GOOTY
1049	GVD	2	132	GARIVIDI
213	GVD	2	220	GARIVIDI
552	GVD	2	400	GARIVIDI
774	GVD2	2	220	GARIVIDI 400KV SS 220KV BUS
1050	GZK	3	132	GAJUWAKA
214	GZK	3	220	GAJUWAKA
1051	HDP	12	132	HINDUPUR
244	HDP	12	220	HINDUPUR
441	HDP	12	400	ANANTHAPUR
260	HDP2	12	220	HINDUPUR 400KV/200KV SS
9848	HDP2G1	12	11	HINDUPUR-2 GEN-1
9849	HDP2G2	12	11	HINDUPUR-2 GEN-2
9850	HDP2G3	12	11	HINDUPUR-2 GEN-3
9851	HDP2G4	12	11	HINDUPUR-2 GEN-4

9834	HDPG1	12	11	HINDUPUR GEN-1
9835	HDPG2	12	11	HINDUPUR GEN-2
9836	HDPG3	12	11	HINDUPUR GEN-3
9837	HDPG4	12	11	HINDUPUR GEN-4
9838	HDPG5	12	11	HINDUPUR GEN-5
9797	HDPW1	12	22	
9798	HDPW2	12	22	
1052	HMP	12	132	HAMPI 132KV BUS
9757	HMP	12	10.6	HAMPI GEN-1
9758	HMP	12	10.6	HAMPI GEN-2
9759	HMP	12	10.6	HAMPI GEN-3
9760	HMP	12	10.6	HAMPI GEN-4
9761	HMP	12	10.6	HAMPI GEN-5
9762	HMP	12	10.6	HAMPI GEN-6
9763	HMP	12	10.6	HAMPI GEN-7
556	HNPCL	3	400	HINDUJA THERMAL POWER PLANT 400KV BUS
9795	HNPCL	3	22	HINDUJA THERMAL POWER PLANT GEN-1
9796	HNPCL	3	22	HINDUJA THERMAL POWER PLANT GEN-2
766	HZL	3	220	HINDUSTAN ZINC LTD BULK LOAD
521	ICHPRM	1	400	ICHAPURAM 400KV BUS
804	IFCO	9	220	IFCO BULK LOAD
9404	IGCCVJA	6	15.75	
568	INVOL	7	400	INAVOLU/THULLUR
816	INVOL	7	220	INAVOLU/THULLUR
487	ISPAT	4	400	
757	JGMPT	4	220	
266	JGP	4	220	JEGURUPADU 220KV BUS
9140	JGP	4	11	JEGURUPADU GEN-1
9141	JGP11	4	11	JEGURUPADU EXTN GEN-1
9142	JGP11	4	11	JEGURUPADU EXTN GEN-2
9731	JGP2	4	11	JEGURUPADU GEN-2
9732	JGP3	4	11	JEGURUPADU GEN-3
9733	JGP4	4	11	JEGURUPADU GEN-4

490	JGPE(GVK2)	4	400	JEGURUPADU EXTN 400KV BUS
9832	JMG223	11	11	JAMMALAMADUGU WIND GEN-1
9833	JMG224	11	11	JAMMALAMADUGU WIND GEN-2
9830	JMG22G1	11	11	JAMMALAMADUGU WIND GEN-3
9831	JMG22G2	11	11	JAMMALAMADUGU WIND GEN-4
1567	JMLMDG	11	132	JAMMALAMADUGU 132KV BUS
784	JMLMDG	11	220	JAMMALAMADUGU 220KV BUS
555	JMLMG	11	400	JAMMALAMADUGU 400KV BUS
777	JMLMG	11	220	JAMMALAMADUGU 400KV 220 KV BUS
9799	JMLMGW1	11	22	
9800	JMLMGW2	11	22	
9801	JMLMGW3	11	22	
1060	KDA	4	132	KAKINDA
274	KDA	4	220	KAKINADA
1579	KDASEZ	4	132	KAKINDA SEZ
575	KDASEZ	4	400	KAKINDA SEZ
800	KDASEZ	4	220	KAKINDA SEZ 220KV BUS
1061	KDP	6	132	KONDAPALLI
216	KDP	6	220	KONDAPALLI
9170	KDP	6	15	KONDAPALLI GEN-1
9171	KDP	6	15	KONDAPALLI GEN-2
9748	KDP 2	6	15	KONDAPALLI GEN-3
1596	KDPEXT	6	132	KONDAPALLI EXTN SS 132KV BUS
820	KDPEXT	6	220	KONDAPALLI EXTN SS 220KV BUS
1540	KDPRM	11	132	KONDAPURAM/JAMMALAMADUGU
686	KDPRM	11	220	KONDAPURAM/JAMMALAMADUGU
1585	KDRI	12	132	KAIDIRI
793	KDRI	12	220	KAIDIRI
634	KGIRI	13	220	KANIGIRI
267	KGS	4	220	SPECTRUM (KGS) 220KV BUS
9145	KGS	4	11.5	SPECTRUM (KGS) GEN-1
9736	KGS2	4	11.5	SPECTRUM (KGS) GEN-2
9737	KGS3	4	11.5	SPECTRUM (KGS) GEN-3
9739	KGS41	4	11.5	SPECTRUM (KGS) GEN-4

1198	KLDG	12	132	KALYANDURG
301	KLDG	12	220	KALYANDURG
239	KLK	10	220	KALIKIRI
554	KLK	10	400	KALIKIRI
776	KLK2	10	220	KALIKIRI 220KV BUS
1066	KLKR	10	132	KALIKIRI
9183	KLVPLG	12	11	
566	KMNK	9	400	KRISHNA PATNAM MINAKSHI
9634	KMNK	9	11	MINAKSHI GEN
541	KNCC	9	400	KRISHNAPATNAM NCC GEN 400KV BUS
9636	KNCC	9	11	KRISHNAPATNAM NCC GEN
1451	KNDKR(PRKSM)	8	132	KANDUKUR
392	KNDKR(PRKSM)	8	220	KANDUKUR
815	KNGR	8	220	KANIGIRI
1591	KNGRI	8	132	KANIGIRI
287	KNL	13	220	KURNOOL
410	KNL	13	400	KURNOOL
951	KNL765	13	765	KUNROOL 765KV
542	KNL765-2	13	400	KURNUL-765
7024	KNLGHP	70	400	KURNOOL - GHANAPUR (ISTS)
7015	KNL-RAI	70	765	KURNOOL - RAICHOOR (ISTS)
7016	KNL-TV	70	765	KURNOOL - TIRUVELAM (ISTS)
264	KOD	11	220	KODUR
7022	KPK-KMM	70	400	KALAPAKA - KHAMMAM (ISTS)
515	KPT	9	400	KRISHNAPATNAM 400KV BUS
1583	KPT2SS	9	132	KRISHNAPATNAM 132KV BUS
823	KPT2SS	9	220	KRISHNAPATNAM 220KV BUS
9082	KPT7U1	9	22	KRISHNAPATNAMGEN-1
9083	KPT7U2	9	22	KRISHNAPATNAMGEN-2
9084	KPT7U3	9	22	KRISHNAPATNAMGEN-3
9085	KPT7U4	9	22	KRISHNAPATNAMGEN-4
549	KRPL	3	400	KORUPROLU 400KV BUS
1522	KRPL(NKPL)	3	132	KORPROLU
662	KRPL2(NKPL)	3	220	KORPROLU 400KV SS 220KV BUS

9630	KRTP1	9	11	
9631	KRTP2	9	11	
9632	KRTP3	9	11	
567	KSMHP	9	400	KRISHANPATNAM SIMHAPURI 400KV BUS
9635	KSMHP	9	11	KRISHANPATNAM SIMHAPURI GEN
565	KTMP	9	400	KRISHNAPATNAM THERMAL POWER TECH 400KV BUS
9633	KTMPTC	9	11	KRISHNAPATNAM THERMAL POWER TECH GEN
1528	KUPPM	10	132	KUPPAM
668	KUPPM	10	220	KUPPAM
1081	KVKT	5	132	KAMAVARAPU KOTA 132KV BUS
335	KVKT	5	220	KAMAVARAPUKOTA
511	KVKT	5	400	KAMAVARAPUKOTA 400KV
642	KVKT	5	220	KAMAVARAPU KOTA 400KV SS 220KV BUS
7041	KVKT-SURY	70	400	KAMAVARAPUKOTA - SURYAPET (ISTS)
1584	KVLI	9	132	KAVALI
803	KVLI	9	220	KAVALI
547	LANC2	6	400	LANCO EXTN 400KV
290	LANCO	6	220	LANCHO
9172	LANCO2	6	16.5	LANCO EXTN 400KV
635	LKSG1	13	220	LAKKASAGARAM-1
636	LKSG2	13	220	LAKKASAGARAM-2
218	LS	4	220	LOWER SILERU
9050	LS	4	11	LOWER SILERU GEN-1
9728	LS	4	11	LOWER SILERU GEN-2
9729	LS	4	11	LOWER SILERU GEN-3
9730	LS	4	11	LOWER SILERU GEN-4
7030	LS-KTS	70	220	LOWER SILERU - KTS (ISTS)
7031	LS-KTSV	70	220	LOWER SILERU - KTS-V STG (ISTS)
7009	LSL-BR	70	220	LOWER SILERU - BURSUR (ISTS)
1190	MACP	6	132	MACHILIPATNAM
768	MACP	6	220	MACHILIPATNAM

639	MALYA-LI	13	220	MALYALA LI
756	MCHMRI	13	220	MUCHUMARRI
1085	MCL	7	132	
256	MDN	11	220	MUDDANUR 220KV
647	MDN2	11	220	MUDDANUR 400KV SS 220KV BUS
519	MDN4	11	400	MUDDANUR 400kV BUS
1552	MDNPL	10	132	MADANAPALLI
710	MDNPLI	10	220	MADANAPALLI
1088	MKD	3	132	MARCHIKANDI 132KV BUS
9090	MKD	3	11	MARCHIKANDI GEN-1
9764	MKD 2	3	11	MARCHIKANDI GEN-2
9765	MKD 3	3	11	MARCHIKANDI GEN-3
9766	MKD 4	3	11	MARCHIKANDI GEN-4
9767	MKD 5	3	11	MARCHIKANDI GEN-5
9771	MKD 6	3	11	MARCHIKANDI GEN-6
1578	MLKPM	7	132	MALKAPURAM
799	MLKPM	7	220	MALKAPURAM
1542	MNBL	9	132	MANUBOLU
529	MNBL	9	400	MANUBOLU 220KV SS
1373	MRK	8	132	MARKAPURAM
305	MRK	8	220	MARKAPURAM
396	MTYCRV	12	220	MUTYALACHERUVU
1588	MUTCHV	12	132	MUTYALACHERUVU
1472	MYD	11	132	MAYADUKUR 132KV
242	MYD	11	220	MYDUKUR
574	MYLVRM	11	400	MYLAVARAM
826	MYLVRM2	11	220	MYLAVARAM-2
9846	MYLVRMG1	11	11	MYLAVARAM GEN-1
9847	MYLVRMG2	11	11	MYLAVARAM GEN-2
1095	NAD	13	132	NANDYALA
261	NAD	13	220	NANDYALA
1590	NAGAU	7	132	NAGARJUNA UNIVERSITY
814	NAGAU	7	220	NAGARJUNA UNIVERSITY
1123	NAGR	10	132	NAGARI

367	NAGR	10	220	NAGARI
9162	NAGR-GEN	1	15.75	
1096	NAVW	3	132	NAVEL WHERF
1318	NDVL	5	132	NIDAVAOLU
282	NDVL	5	220	NIDADAVOLE 220KV
1576	NDYPT(MNKR)	9	132	NAIDUPET
797	NDYPT(MNKR)	9	220	NAIDUPET
1101	NLR	9	132	NELLORE
221	NLR	9	220	NELLORE
422	NLR(PG)	9	400	NELLORE
528	NLR4AP	9	400	NELLORE AP 400KV BUS
821	NLR4AP	9	220	NELLORE AP 400KV SS 220KV BUS
954	NLR7	9	765	NELLORE 765KV
569	NLR74KV	9	400	NELLORE 765KV 400KV BUS
7010	NLR-MD	70	400	NELLORE - MADRAS (ISTS)
317	NLRP(MNBL)	9	220	MANUBOLU 220KV SS
7019	NLRPG-TV	70	400	NELLORE (PGCIL) - TIRUVELAM (ISTS)
564	NLRPL	9	400	NELLORE POOLING STATION
7012	NLRTN3	70	400	NELLORE - TAMILANADU (ISTS)
1512	NNA	6	132	NUNNA
262	NNA	6	220	NUNNA
406	NNA	6	400	NUNNA
387	NNA220	6	220	NUNNA 200 KV
7029	NNA-KMM	70	400	NUNNA - KHAMMAM (ISTS)
7032	NNA-KTS	70	220	NUNNA - KTS (ISTS)
637	NNSLA	13	220	NANASARULA
9804	NPKG1	12	11	N.P.KUNTA GEN-1
9805	NPKG2	12	11	N.P.KUNTA GEN-2
559	NPKT	12	400	N.P.KUNTA GEN 400KV BUSS
792	NPKT2	12	220	N.P.KUNTA 220KV BUS
1390	NRSP	7	132	NARSARAOPET
380	NRSP	7	220	NARSARAOPETA
1480	NSTP	7	132	NAGARJUNA SAGAR TAIL POND
9481	NSTP1	7	11	NAGARJUNA SAGAR TAIL POND GEN-1

705	NSTP2	7	220	NAGARJUNA SAGAR TAIL POND 220KV BUS
9482	NSTP2	7	11	NAGARJUNA SAGAR TAIL POND GEN-2
1105	NTS	9	132	NTS
9040	NTS	9	11	
1582	NTSKVR	9	132	NTSKAVURU 132KV BUS
822	NTSKVR	9	220	NTSKAVURU 220KV BUS
1559	NZVDU	6	132	NUZIVEEDU
769	NZVDU	6	220	NUZIVEEDU
950	ODAREV	8	765	ODAREVU GEN 765KV BUS
9786	ODARGEN	8	22	ODAREVU GEN -1
9787	ODARGEN2	8	22	ODAREVU GEN -2
9788	ODARGEN3	8	22	ODAREVU GEN -3
9789	ODARGEN4	8	22	ODAREVU GEN -4
9790	ODARGEN5	8	22	ODAREVU GEN -5
1109	ONG	8	132	ONGOLE
223	ONG	8	220	ONGOLE
9813	ORS7GN	1	22	ORISSA GEN-1
9812	ORSGEN	1	22	ORISSA GEN-2
1525	PALNTLA	5	132	PALLANTLA
665	PALNTLA	5	220	PALLANTLA
957	PALSA	1	765	PALASA 765KV SS
550	PDMDK	3	400	PUDIMADAKA 400KV BUS
958	PDMDK	3	765	PUDIMADAKA 765KV BUS
9791	PDMDK1	3	11	PUDIMADAKA GEN-1
9792	PDMDK2	3	11	PUDIMADAKA GEN-2
9793	PDMDK3	3	11	PUDIMADAKA GEN-3
9794	PDMDK4	3	11	PUDIMADAKA GEN-4
9817	PDMDK4	3	11	PUDIMADAKA GEN-5
6006	PDMK-MD	70	400	PUDIMADAKA - MADRAS (ISTS)
1113	PDP	4	132	PEDDAPURAM (SAMARLAKOTA)
303	PDP	4	220	PEDDAPURAM (SAMARLAKOTA)
246	PEN	3	220	PENDUGONDA
1197	PEND	3	132	PENDURTHY
525	PEND4	3	400	PENDURTHY 40KV SS

1561	PENGD	12	132	PENGONDA
778	PENGD	12	220	PENUGONDA
331	PENNA	12	220	PENNA
787	PFIL	10	220	PFIL BULK LOAD
1112	PIDGRL	7	132	PIDUGURALLA
758	PIDGRL	7	220	PIDUGURALLA
1520	PLKD	1	132	PALAKONDA
660	PLKD	1	220	PALAKONDA
1116	PLMNR	10	132	PALAMANERU
341	PLMNR	10	220	PALAMANERU
1122	PLV	11	132	PULIVENDULA
399	PLV	11	220	PULIVENDULA
9821	PMDKG1	3	22	
9822	PMDKG2	3	22	
9823	PMDKG3	3	22	
9824	PMDKG4	3	22	
779	PMPRTD	12	220	PAMPANURUTANDA
1117	PMRU	6	132	PAMARRU
1580	POD	8	132	PODILI
254	POD	8	220	PODILI 220KV
517	POD	8	400	PODILI 400KV
622	POD2	8	220	PODILI 400KV SS 220KV BUS
9640	POL1	5	11	POLAVARAM GEN-1
9649	POL10	5	11	POLAVARAM GEN-10
9650	POL11	5	11	POLAVARAM GEN-11
9651	POL12	5	11	POLAVARAM GEN-12
9641	POL2	5	11	POLAVARAM GEN-2
9642	POL3	5	11	POLAVARAM GEN-3
9643	POL4	5	11	POLAVARAM GEN-4
9644	POL5	5	11	POLAVARAM GEN-5
9645	POL6	5	11	POLAVARAM GEN-6
9646	POL7	5	11	POLAVARAM GEN-7
9647	POL8	5	11	POLAVARAM GEN-8
9648	POL9	5	11	POLAVARAM GEN-9

535	POLA	5	400	POLAVARAM 400KV BUS
698	POLA	5	220	POLAVARAM 220KV BUS
571	POLK4	1	400	POLAKI 400KV BUS
9818	POLKG1	1	22	POLAKI GEN-1
9825	POLKG1	1	22	POLAKI GEN-2
9819	POLKG2	1	22	POLAKI GEN-3
9826	POLKG2	1	22	POLAKI GEN-4
9820	POLKG3	1	22	POLAKI GEN-5
9827	POLKG3	1	22	POLAKI GEN-6
9828	POLKG4	1	22	POLAKI GEN-7
960	POLKI	1	765	POLAKI 765KV BUS
1562	PPNRTD	12	132	PAMPANURUTANDA
1120	PRCH	8	132	PARCHUR
340	PRCH	8	220	PARCHUR
1566	PRMAML	11	132	PORUMAMILLA
783	PRMAML	11	220	PORUMAMILLA
1558	PRTPD	4	132	PRATTIPADU
767	PRTPD	4	220	PRATTIPADU
1408	PRWD	3	132	PARWDA
304	PRWD	3	220	PARWADA
638	PSWS	13	220	
9181	PTKGN2	13	11	
808	PTKND	13	220	
9785	PULGEN	11	11	
706	PULICHT	7	220	PULICHINTALA 220KV BUS
1517	PULICHTLA	13	132	PULICHINTALA 132KV BUS
9701	PULICHTLA2	13	11	PULICHINTALA GEN-1
9702	PULICHTLA3	13	11	PULICHINTALA GEN-2
9703	PULICHTLA4	13	11	PULICHINTALA GEN-3
9700	PULICTLA1	13	11	PULICHINTALA GEN-4
1557	PYBHM	1	132	PYDHIBHIMAVARAM
723	PYBHM	1	220	PYDHIBHIMAVARAM
813	PYLRGN	12	220	
9182	PYLRGN1	12	11	

1356	RAZOL	4	132	RAZOLU
1515	RCHGN	10	132	RACHAGUNNERI
656	RCHGN	10	220	RACHAGUNNERI
646	RCHGN2	10	220	RACHAGUNEERI 400KV SS 220KV BUS
518	RCHGN4	10	400	RACHAGUNEERI 400KV
801	RCHPD	9	220	RACHERLAPADU
1581	RCHRLPD	9	132	RACHERLAPADU
1385	RCL	3	132	RCL
9502	RCL	3	11	RCL GEN
810	REPAL	7	220	REPALLE
1589	REPALI	7	132	REPALLE
6002	RGL-ALP	70	220	REGULAPADU - ALIPIRI (ISTS)
704	RGLPD-LI	12	220	REGULAPADU LI
1312	RJP	11	132	RAJAMPETA
243	RJP	11	220	RAJAMPETA
263	RMG	12	220	RAMAGIRI
329	RMPC	4	220	RAMPACHODAVARAM
1129	RNG	10	132	RENIGUNTA 132KV
249	RNG	10	220	RENIGUNTA 220KV
1503	RNTCH	7	132	RENTACHINTALA
645	RNTCH	7	220	RENTACHINTALA
9001	RST1	70	22	RAMAGUNDAM GEN1
9002	RST2	70	22	RAMAGUNDAM GEN2
9003	RST3	70	22	RAMAGUNDAM GEN3
9004	RST4	70	22	RAMAGUNDAM GEN4
9005	RST5	70	22	RAMAGUNDAM GEN5
9006	RST6	70	22	RAMAGUNDAM GEN6
9007	RST7	70	22	RAMAGUNDAM GEN7
7002	RSTCH	70	400	RST-CHANDRAPUR(ISTS)
7001	RST-G	70	400	
9754	RTPP	11	15.75	RTPP MUDDANUR GEN-5
9755	RTPP	11	15.75	RTPP MUDDANUR GEN-6
9030	RTPP1	11	15.75	RTPP MUDDANUR GEN-1
9031	RTPP3	11	15.75	RTPP MUDDANUR GEN-2

9032	RTPP5	11	15.75	RTPP MUDDANUR GEN-3
9033	RTPP6	11	15.75	RTPP MUDDANUR GEN-4
1375	RVK	6	132	RAVIKAMATAM
9501	RVK	6	11	RAVIKAMATAM GEN-1
9768	RVK 2	6	11	RAVIKAMATAM GEN-2
770	SATSEZ	10	220	SREE CITY SATSEZ
691	SBQSTL	9	220	SBQ STEEL
790	SBRYPL	12	220	SUBBRAYANAPALLI
788	SHPRM	12	220	SHAPURAM
409	SLB	13	400	SRISAIALM LEFT BANK 400KV BUS
7020	SLB-KNL	70	400	SRISAILAM LEFT BANK - KURNOOL (ISTS)
7021	SLB-STNPL	70	400	SRISAILAM LEFT BANK - SATTENAPALLI (ISTS)
1140	SLP	9	132	SULLURPET
227	SLP	9	220	SULLURPET
6005	SLP-GU	70	220	SULLURPET - GUMMADIPUDI (ISTS)
414	SMH	3	400	SIMHADRI
9190	SMHD	3	22	SIMHADRI GEN-1
9715	SMHD	3	22	SIMHADRI GEN-2
9191	SMHDE	3	22	SIMHADRI GEN-3
9716	SMHDE	3	22	SIMHADRI GEN-4
415	SMHEX	4	400	SIMHADRI EXTN 400KV BUS
570	SRKLM	1	400	SRIKAKULAM 400KV BUS
959	SRKLM	1	765	SRIKAKULAM 765KV BUS
956	SRKLM765	1	765	SRIKAKULAM 765KV BUS
1145	SS	13	132	SRISAIALM
229	SS	13	220	SRISAIALM
9080	SS	13	11	SRISAIALM RIGHT BANK GEN-1
9719	SS	13	11	SRISAIALM RIGHT BANK GEN-2
9720	SS	13	11	SRISAIALM RIGHT BANK GEN-3
9721	SS	13	11	SRISAIALM RIGHT BANK GEN-4
9722	SS	13	11	SRISAIALM RIGHT BANK GEN-5
9723	SS	13	11	SRISAIALM RIGHT BANK GEN-6
9724	SS	13	11	SRISAIALM RIGHT BANK GEN-7

7038	SS-DND	70	220	SRISAILAM RB - DINDI (ISTS)
9125	SSLB	13	13.8	SRISAILAM LEFT BANK GEN-1
9706	SSLB	13	13.8	SRISAILAM LEFT BANK GEN-2
9707	SSLB	13	13.8	SRISAILAM LEFT BANK GEN-3
9708	SSLB	13	13.8	SRISAILAM LEFT BANK GEN-4
9709	SSLB	13	13.8	SRISAILAM LEFT BANK GEN-5
9710	SSLB	13	13.8	SRISAILAM LEFT BANK GEN-6
7036	SSRB-NS	70	220	SRISAILAM RB - NAGARAJUNA SAGAR (ISTS)
432	STNPL	7	400	NARSARAOPETA
381	STNPL2	7	220	NARSARAOPETA 220kV
624	STPLI	13	220	SETTIPALLI
251	SYZ	13	220	SOMAYAJULAPALLI
824	TALCH2	12	220	TALLARICHERUVU
9845	TALCHVG1	12	11	TALLARICHERUVU GEN
572	TALCHVU	12	400	TALLARICHERUVU
1148	TBV	2	132	TB VARA
1045	TDK	7	132	TADIKONDA
211	TDK	7	220	TADIKONDA
1592	TDPLI	7	132	TADEPALLI
811	TDPLI	7	220	TADEPALLI
1150	TDPT	12	132	TADIPATRI
325	TDPT	12	220	TADIPATRI
522	TEKKALI4	1	400	TEKKALI 400KV BUS
1152	TKL	1	132	TEKKALI
330	TKL	1	220	TEKKALI
687	TMPRM	11	220	TIMMAPURAM
1551	TMPUR	10	132	THIMMAPURAM
709	TMPUR	10	220	THIMMAPURAM
6003	TND-SA	70	220	TANDOOR - SADEM (ISTS)
230	TPL	7	220	TALLAPALLI
404	TPL	7	400	TALLAPALLI 400KV
7035	TPL12-NNA	70	220	TALLAPALLI 1,2 - NUNNA (ISTS)
7034	TPL3-NS	70	220	TALLAPALLI 3 - NUNNA (ISTS)
7037	TPL-CKLT	70	220	TALLAPALLI - CHALAKURTHY (ISTS)

7028	TPL-GHP	70	400	TALLAPALLI - GHANAPUR (ISTS)
7027	TPL-KMM	70	400	TALLAPALLI - KHAMMAM (ISTS)
7026	TPL-RST	70	400	TALLAPALLI - RAMAGUNDAM (ISTS)
7025	TPL-VLTR	70	400	TALLAPALLI - VELTUR (ISTS)
1563	TRMPLY	11	132	THIRUMALAYYAPALLI
780	TRMPLY	11	220	THIRUMALAYYAPALLI
775	URV2	12	220	URAVAKONDA 400KV SS 220KV BUS
9839	URV2G1	12	11	URAVAKONDA GEN-1
9840	URV2G2	12	11	URAVAKONDA GEN-2
9841	URV2G3	12	11	URAVAKONDA GEN-3
9842	URV2G4	12	11	URAVAKONDA GEN-4
9843	URV2G5	12	11	URAVAKONDA GEN-5
9844	URV2G6	12	11	URAVAKONDA GEN-6
553	URVKD	12	400	URAVAKONDA 400KV SS
7042	URV-VLTR	70	400	URAVAKONDA - VELTUR (ISTS)
9802	URVW1	12	22	
825	URVW2-2	12	220	URAVAKONDA-2 220KV BUS
573	URVWD2	12	400	URAVAKONDA -2 400KV BUS
9829	URVWG2	12	22	
231	US	3	220	UPPER SILERU
9045	US1	3	11	UPPER SILERU GEN-1
9725	US2	3	11	UPPER SILERU GEN-2
9726	US3	3	11	UPPER SILERU GEN-3
9727	US4	3	11	UPPER SILERU GEN-4
1568	VAJKRR	12	132	VAJRAKARUR
785	VAJKRR	12	220	VAJRAKARUR
1382	VATSA	4	132	VATSA
9503	VATSA	4	11	VATSA GEN-1
9769	VATSA 2	4	11	VATSA GEN-2
9770	VATSA 3	4	11	VATSA GEN-3
232	VJS	4	220	VIJJESWARAM
9130	VJS	4	11	VIJJESWARAM GEN-1
9734	VJS2	4	11	VIJJESWARAM GEN-2
9735	VJS3	4	11	VIJJESWARAM GEN-2

277	VJSN	4	220	VIJJESWARAM NEW 220KV BUS
9135	VJSN	4	11.5	VIJJESWARAM NEWGEN-1
9738	VJSN	4	11.5	VIJJESWARAM NEWGEN-2
7007	VLT-RC	70	400	VELTUR - RAICHUR (ISTS)
298	VMG	4	220	VEMAGIRI
416	VMG	4	400	VEMAGIRI
419	VMG74	4	400	VEMAGIRI 765KV 400KV BUS
952	VMG765	4	765	VEMAGIRI 765KV BUS
544	VOD	8	400	VODAREVU 400KV BUS
233	VSP	3	220	VSP PLANT
9150	VSP	3	11	VSP PLANT GEN
6001	VSP-G	3	220	
234	VSS	3	220	VIZAG SWITCHING STATION
407	VSS	3	400	VSS
7008	VSS-JP	70	400	VSS - JAIPUR (ISTS)
9749	VTPS U2	6	15.75	VIJAYAWADA THERMAL POWER STATION GEN-2
9750	VTPS U3	6	15.75	VIJAYAWADA THERMAL POWER STATION GEN-3
9751	VTPS U4	6	15.75	VIJAYAWADA THERMAL POWER STATION GEN-4
9752	VTPS U5	6	15.75	VIJAYAWADA THERMAL POWER STATION GEN-5
9753	VTPS U6	6	15.75	VIJAYAWADA THERMAL POWER STATION GEN-6
9020	VTPS1	6	15.75	VIJAYAWADA THERMAL POWER STATION GEN-1
1251	VTS	6	132	VIJAYAWADA THERMAL POWER STATION 132KV BUS
235	VTS	6	220	VIJAYAWADA THERMAL POWER STATION
427	VTS4	6	400	VIJAYAWADA THERMAL POWER STATION STAGE-4
9403	VTSIV	6	22	VIJAYAWADA THERMAL POWER STATION STAGE-4 GEN
7023	VTS-MLK	70	400	VTS - MALKARAM (ISTS)
9405	VTSV	6	22	VIJAYAWADA THERMAL POWER STATION STAGE-5
9814	VTSVI	6	22	VIJAYAWADA THERMAL POWER STATION STAGE-6

297	VZG	3	220	VIZAG SWITCHING STATION
412	VZG	3	400	KALPAKA (VIZAG GENARATION)
9165	VZG-CB1	3	15.75	
9166	VZG-CB2	3	15.75	
9167	VZG-CB3	3	15.75	
1208	VZNM	2	132	VIZIANGARAM
374	VZNM	2	220	VIZIANGARAM
688	YELNR	11	220	YELLANUR
1160	YGT	11	132	YERRAGUNTLA
257	YGT	11	220	YERRAGUNTLA
1530	YMNGR	13	132	YEMMIGANUR
670	YMNGR	13	220	YEMMIGANUR

COST ABSTRACT		
SL.NO	**DESCRIPTION**	**AMOUNT IN LAKHS**
400/220 KV SUBSTATION		
1	400 kV D/C LINE COST/KM TWIN MOOSE	157.00
2	400 kV D/C LINE COST/KM QUAD MOOSE	240.00
3	400 kV BAY EXTENSION	699.00
4	315 MVA TRANSFORMER WITH TRS BAY	1,877.00
5	500 MVA TRANSFORMER WITH TRS BAY	2,329.00
6	COST OF A 400/220 kV SUB-STATION (WITH TWO 315 MVAPOWER TRANSFORMER, FOUR 400kV FEEDER BAYS AND 2 Nos. 220kV FEEDER BAYS)	12,381.00
7	COST OF A 400/220 kV SUB-STATION (WITH 0 MVA POWER TRANSFORMER)	5,455.00
220/132KV SUBSTATION		
8	220/132 KV SUBSTATION WITH 2 x100 MVA POWER TRANSFORMERS , 2 Nos. 220 kV FEEDER BAYS AND 4 Nos. OUTGOING 132 kV FEEDER BAYS.	3569
9	220/132 KV SUBSTATION WITH 0 MVA POWER TRANSFORMERS	1753
10	220 kV DC LINE ON GALVANISED TOWERS WITH SINGLE MOOSE ACSR CONDUCTOR (DATA FOR 1 KM).	122
11	220 kV DC LINE ON GALVANISED TOWERS WITH TWIN MOOSE ACSR CONDUCTOR (DATA FOR 1 KM).	150
12	220 kV DC/SC LINE ON GALVANISED TOWERS WITH SINGLE MOOSE ACSR CONDUCTOR (DATA per KM).	101
13	COST DATA FOR 1 No. 220 KV BAY EXTENSION	188
14	ERECTION OF 220 kV SECOND CIRCUIT STRINGING ON GALVANISED TOWERS WITH MOOSE ACSR CONDUCTOR (DATA per KM).	22
15	PROVIDING OFC EQUIPMENT FOR 220 kV SUB-STATION	

16	100 MVA TRANSFORMER WITH TRS BAY COST	506
17	160 MVA TRANSFORMER WITH TRS BAY COST	650
18	COST DATA FOR 1 No.132 KV BAY EXTENSION	107