POWER FOR ALL

Telangana State

A JOINT INITIATIVE OF

Government of Telangana

Government of India

Foreword

सत्यमेव जयते

Electricity consumption is one of the most important indices that decide the development level of a nation. The Government of India is committed to improving the quality of life of its citizens through higher electricity consumption. Our aim is to provide each household access to electricity, round the clock. The 'Power for All' programme is a major step in this direction.

This joint initiative of Government of India and Government of Telangana aims to further enhance the satisfaction levels of the consumers and improve the quality of life of people through 24x7 power supply. This would lead to rapid economic development of the state in all sectors resulting in inclusive development of the State.

I compliment the Government of Telangana and wish them all the best for implementation of this programme. The Government of India will complement the efforts of Government of Telangana in bringing uninterrupted quality power to all households, industries, commercial business, public needs & any other electricity consuming entities and adequate power to agriculture as per the state policy.

Piyush Goyal

Minister of State with Independent Charge for
Power, Coal and New & Renewable Energy

Foreword

Power sector is the core engine of growth in any economy and more so in the newly formed State of Telangana. Providing quality and reliable power at an affordable cost is critical towards fulfilling the high growth aspirations of the people in the state of Telangana.

My Government has taken many steps in this regard for meeting the above objective. TS Genco has planned massive capacity additions to the tune of over 6,000 MW from conventional sources and corresponding enhancements in transmission and distribution are also under way. Government of Telangana (GoTS) intends to provide 9 hours of day-time supply of power to agricultural consumers in the state. In addition to the quality and reliability of power supply, the other key aspect which needs to be considered is sustainability. The discoms have been successful in adding solar based capacities at a competitive price. Going forward this would enable the state in having a more sustainable fuel mix.

Investment and industralization would result in financial stability and economic progress of the newly formed state. Government of Telangana (GoTS) has provided a stable and attractive environment for investors in the state, through progressive policies.

TS, being a new state, requires adequate energy to build a new economy, attract investments and accelerate growth. We need to facilitate the expansion of economy by providing a conducive policy environment, infrastructure and power. 'Power for All' program is an excellent platform for addressing these.

K. Chandrashekhar Rao
Chief Minister of Telangana State

Foreword

The State of Telangana, formed on June 2, 2014 is the youngest state in the country. Government of Telangana State (GoTS) recognizes the critical role which power sector plays in the socio-economic development of the state.

Within a year of its formation, the State of Telangana has taken rapid strides in the power sector and GoTS has chalked out an action plan to make the State self-sufficient in power over the next few years.

Due to the progressive policies implemented by GoTS, the state is expected to witness a high socio-economic growth trajectory. This would translate to higher requirement of power over the next few years. The state is fully geared up to meet the additional demand and has plans of adding over 6,000 MW of power from conventional sources over the next few years. Telangana discoms have been successfully harnessing the solar potential in the state and this will enable the state to have a more sustainable fuel mix in the years to come.

'Power for All' programme is conceptualized as a joint initiative between Government of India and the States. This is a core programme which enables greater co-ordination amongst all the stakeholders concerned and this is expected to address concerns such as project delays, timely disbursements of grants, realization of benefits by consumers.

G Jagadish Reddy
Energy Minister
Telangana State

Government of Telangana

Government of India

Joint Statement

Telangana is one of the states in the country selected for '24x7 Power for All' (PFA) programme. This programme will be implemented by Government of Telangana (GoTS) with active support from Government of India with the objective to connect the unconnected in phased manner by FY 18, ensure 24x7 quality, reliable and affordable power supply to all Domestic, Commercial Agriculture and Industrial consumers within a fixed time frame.

Government of Telangana is attaching highest priority to power sector and power supply position is been reviewed by the State Cabinet on periodic basis and is committed to provide full support to all utilities for ensuring quality power supply.

Government of Telangana would ensure that all the necessary steps outlined in the PFA document are taken up in terms of capacity addition, power procurement, strengthening the required transmission and distribution network, encouraging renewables, energy efficiency measures, undertaking customer centric initiatives, reduction of AT & C losses, bridging the gap between ACS & ARR, and following good governance practices in implementation of all central and state government schemes.

Jyoti Arora, IAS
Joint Secretary
Minister of Power (GoI)

Since its formation last year, the state of Telangana has taken many steps towards supplying quality and reliable power to all consumers in the state.

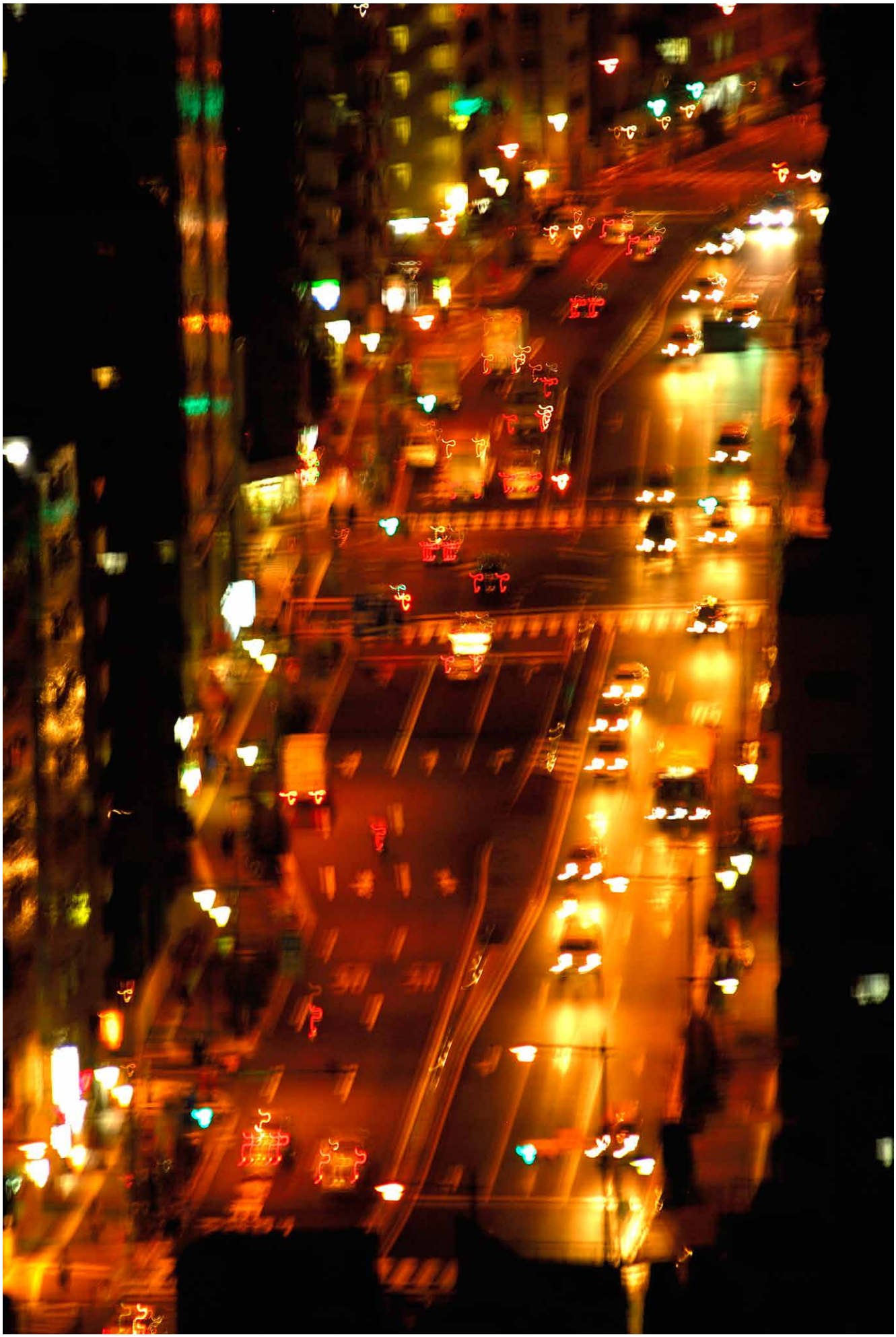
On the generation front, the state is expected to add over 6,000 MW of capacity by FY 2018-19. All the projects contributing to the above capacity have been grounded. Getting timely clearances/ approvals, tying up for adequate fuel linkages is critical for realizing capacity from the above projects.

On the transmission front, creation of adequate intra-state and inter-state transmission infrastructure is needed for timely evacuation of power. Completion of inter-state transmission line between Wardha and Hyderabad is critical for power exchange between NEW Grid and Telangana State

Mission mode of work is required in distribution segment for achieving 100% electrification and in providing quality, and reliable power at an affordable cost.

'Power for All' programme would enable timely resolution of all the issues concerned and in achieving the objective of making the State of Telangana a self-sufficient state by FY 2018-19.

Arvind Kumar, IAS
Secretary to Government
Energy Department
Government of Telangana



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1. Executive summary

24x7- Power for All (24x7 PFA) is a Joint Initiative of Government of India (GoI) and State Governments with the objective to provide 24x7 power available to all households, industry, commercial businesses, public needs, any other electricity consuming entity and adequate power to agriculture farm holdings by FY 19.

The state of Telangana is committed to providing 24x7 power supply to all consumer categories (excluding agriculture, for which power supply shall be as per the GoTS policy) by FY 2018-19. Key aspects of the 24x7 PFA proposal include the following:

- Ensuring 24x7 power supply to all categories including 24 hours supply to rural category by 2017-18 (as against 15 hours supply currently)
- Ensuring 9 hours power supply to agriculture as per the policy of GoTS (as against 7 hours presently).

1.1 Demand Supply Scenario

Quality power to various competing sectors is a sine-qua-non to meet the objectives of the newly formed state of Telangana. Driven by considerable growth in demand from agriculture, domestic and industrial sectors and the metro city of Hyderabad, total energy requirement in Telangana in FY 2014-15 was 50,916 MU. As against this only 48,788 MU was met leading to a deficit of nearly 4%.

Implementation of the above objectives will translate into significant energy requirement owing to key demand drivers including:

- Planned urban centers of Karimnagar, Warangal, Khammam and Nalgonda leading to high commercial, industrial and domestic demand
- Aspirational increase in household per-capita consumption
- Major industrial projects such as Bayyaram steel plant, and large-scale infrastructure additions such as HMR and Water Grid and planned LI schemes
- 5% reserve margin from FY 15-16 onwards.

Given these factors, energy requirement of Telangana is expected to nearly double from 50,916 MU in FY 2014-15 to 105,974 MU by FY 2018-19. The peak demand is also expected to increase three fold from 8,331 MW in FY 2014-15 to 19,053 MW in FY 2018-19. The demand ramp-up of such scale requires planning and readiness across the entire power sector value chain including power procurement/generation, transmission, distribution and financial health.

1.2 Electrification Plan

As on date, there are 44,532 urban and 721,588 rural households to be electrified in the state of Telangana. The state plans to complete its electrification of all households by the end of FY 2017-18 under GoI Schemes like DDUGJY and IPDs.

1.3 Power supply position

Energy deficit in the state of Telangana for last three years was in the range of 4%-12%. The energy requirement was 50,916 MU in FY 14-15, of which only 2,128 MU could not be met resulting in an energy deficit of nearly 4.2%. The state saw a historic maximum peak demand of 8,331 MW in FY 2014-15.

1.4 Generation Plan

The state generation utility, TSGENCO is planning significant investments to the tune of 6,840 MW amounting to a total project cost of INR 42,491 Crs from its upcoming thermal power stations including Kakatiya, Kothagudem, Bhadradri and Damercherla Thermal Power Stations to meet the increasing demand through capacity additions by FY 2018-19. Also TSDISCOMS are planning to procure capacity from various sources including 4,733 MW of power from CGS sources, 4,819 MW of power from other long-term sources and 6,016 MW from Renewable Energy Sources. These capacity additions together sum up to 22,408 MW in installed capacity terms by end of FY 18-19.

In a realistic scenario taking into account manageable delays in COD of power sources and anticipated onset of demand from various major projects, the state will move from a deficit position till FY 2017-18 to a surplus position by FY 2018-19.

1.5 Transmission Plan

The state transmission utility has planned significant investments to the tune of INR 17,803 Crores (excluding the investments for solar parks planned) by the end of FY 18-19 for ensuring adequacy of the system to provide reliable and quality power to the consumers in the state. The above proposed transmission system will be adequate in meeting the projected peak load of over 21,000 MW upto FY 2018-19 and RE power of about 6,016 MW which is mainly through solar generation. The additional transmission system (if required) for evacuation of anticipated RE power more than planned capacity shall also be identified, approved and implemented as per system requirement matching with the RE generation.

Details of the voltage wise adequacy of the network has been shown below:

Table 1: Transmission System Adequacy (FY 2018-19)

Parameter	132KV	220 KV	400KV
Existing (MVA)	14,426	12,815	5,355
Additional (MVA)	5,921	7,522	15,020
Total	**20,347**	**20,337**	**20,375**
Projected Peak Demand (MVA)	**19,281**	**18,575**	**17,254**
% Adequacy	**106%**	**109%**	**118%**

From the above table it shows that the system at 132, 220 and 400 kV voltage level is capable of handling loads in the order of 20,000 MVA and thereby the system is adequate.

Regarding adequacy of inter-state transmission system for meeting power for all programme in the state of Telangana, respective Central Transmission Utility (CTU) would furnish supporting studies and details to CEA within three months.

1.6 Distribution Plan

Investments to the tune of Rs 23,817 Crs are planned in the distribution sector across the state of Telangana. Out of the above investments, Rs 9,973 Crs is towards Integrated Power Development Scheme (IPDS) and Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) in which key priority is connecting the unconnected by putting in place a plan for electrifying all the un-electrified households in the state by FY 2017-18. The other key focus areas include reducing AT & C losses, improving the reliability and quality of supply and schemes have been formulated for feeder separation, HVDS roll out, metering etc.

GoI intervention in the form of grants is required to the extent of 75% of the project cost under DDUJGY and IPDS schemes to meet the objectives of providing 24x7 Power For All in the state of Telangana.

Presently the distribution transformation capacity at 33 kV level is about 15,038 MVA over and above the DISCOMs are planning to add 7,960 MVA amounting to a total of 22,998 MVA by the end of FY 2018-19. Analysis of the peak load at each voltage levels indicate that the system is capable of handling peak loads which is amounting to only 11,953 MVA at 33 kV level.

1.7 Renewable Capacity Addition

Telangana has a vast solar potential with average solar insolation of nearly 5.5 kWh/m2 for more than 300 sunshine days. Government of Telangana (GoTS), intends to make use of the positive environment in solar market and the push given by GoI for substantially harnessing the solar potential in the state of Telangana. Towards this end, investor friendly solar policy has been announced.

The DISCOMs have successfully tied up solar capacity of 515 MW through the competitive bid process which was concluded in Feb 2015. Tender has been floated for procuring another 2000 MW solar capacity. Fund support from GoI is required for promoting solar pumpset schemes, solar roof-tops and off-grid solar projects.

1.8 Financial Viability

TSDISCOMs had made an accumulated cash loss in tune of INR 13,867 Crs at the end FY 2014-15 and the same is expected to be in the range of around INR 29,398 Crs by end of FY 2018-19 assuming no tariff increase and escalation in Power Purchase cost. In order to avoid losses in the year FY 2018-19, the DISCOMs will have to increase tariff to the extent of around 13% on an average for the base case.

This roadmap document presents a comprehensive all-encompassing action plan to prepare the state for achieving the 24x7 PFA objectives. The roadmap has been prepared after an extensive assessment of as-is situation of the state across all aspects, highlights key gaps and discusses potential solutions to bridge these gaps.

Success of 'the Power for All' initiative requires substantial co-ordination between all concerned stake-holders in the Telangana State as well with MoP. It is proposed to set-up a dedicated Project Management Unit (PMU) in the state to programme manage all these initiatives.

02. **Introduction**

2. Introduction

The Government of Telangana is committed to provide 24X7 reliable and quality power to all consumers at an affordable cost in order to bring about all round development and improvement in quality of life.

2.1 Background

In accordance with the provisions of the Andhra Pradesh Reorganization Act 2014 (Act 6 of 2014), attested by the President of India on 1st March 2014, the state of Telangana came into existence on 2nd June 2014 as the 29th and youngest state of India, when it was carved out of the north-western hinterland of Andhra Pradesh.

As per the provisions of Electricity Act 2003, there are independent unbundled utilities operational in state namely:

- Generating Company - Telangana State Power Generation Corporation Limited (TSGENCO)
- Transmission Company - Transmission Corporation of Telangana Limited (TSTRANSCO)
- Distribution Companies
  - Southern Power Distribution Company of Telangana Limited (TSSPDCL)
  - Northern Power Distribution Company of Telangana Limited (TSNPDCL).

Within a short span of its existence, Telangana has emerged as a significant destination for investments in manufacturing industry, infrastructure, etc. and the Government of Telangana has undertaken several policy measures and incentives to encourage inflow of investment into different sectors of its economy.

Hyderabad, the capital city and the largest contributor to the Gross State Domestic Product (GSDP) and other revenues of Telangana. The state is also a major center for tourism, cultural activities and commerce and is the host to many large industrial enterprises including BHEL, NFC, NMDC, BEL, DRDO, HAL, CCMB etc. It is also a hub for major information technology and pharmaceutical companies. Also, Telangana is one of the top IT exporting states of India and about one third of bulk drugs in the country are manufactured in the State.

Table 2: Key Facts about Telangana State

Key Facts[1]	
Constituted on	2nd June 2014
As per 2011 Census	
Area - Administrative Districts - Towns	1,14,840 sq. km - 10 - 158
No. of Villages - Inhabited villages - Uninhabited villages	10,434 - 9834 - 600
Population - Urban Population - Rural Population - No of Households - Population Density	350.04 lakh - 136.09 lakh - 213.95 lakh - 83.58 lakh - 312 persons / sq. km

1 Source: Official Website of Telangana

Besides these, the economy of Telangana is also dependent upon agriculture. Although the region is drained by major rivers like Godavari and Krishna, most of the land is arid, thus making irrigation necessary to support crops such as paddy, cotton, mango and tobacco.

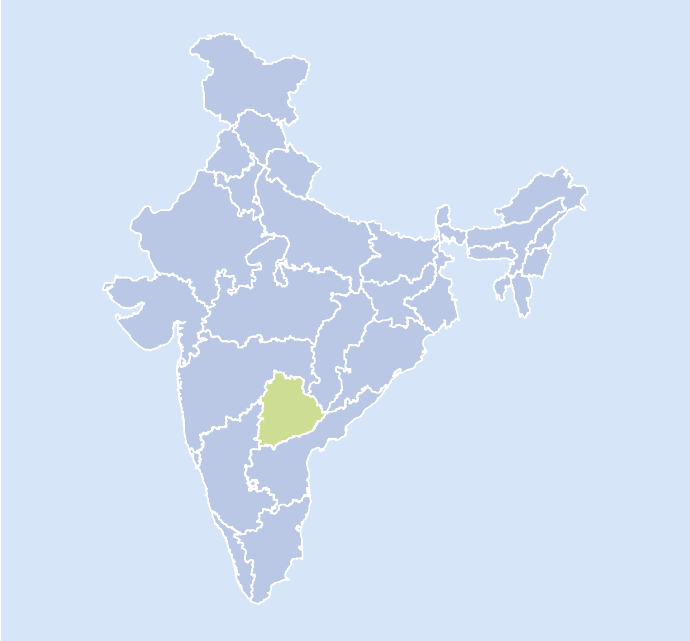
In addition the above, the Government of Telangana is planning significant investments towards development of urban centers in Karimnagar, Warangal, and Nizamabad. Other upcoming major projects in the state include, Hyderabad Metro Rail, Hyderabad ITIR region, Lift Irrigation Schemes, Water Grid Project and Hyderabad-Nagpur Industrial corridor

Per capita energy consumption in Telangana was over 1,394 units (FY 2014-15, as per the data sets furnished by DISCOMs), which is high in comparison to the all India average of 1,010 units (as per CEA). Energy deficit in the state of Telangana was in the range of 4%-12% in the past and energy requirement is expected to significantly increase in the next five years owing to the some of the aforementioned key demand drivers.

The energy availability from existing sources as on FY 2014-15 was about 48,788 MU inclusive of market purchases and coal-based power from long-term sources constituted nearly 66% of energy availability. The unrestricted demand for the state of Telangana was 50,916 MU for the year FY 2014-15 resulting a deficit of 4.2%.

In FY 2014-15 about 75% of the consumers belong to domestic category contributing to about 22% of total sales while agriculture and industrial categories with consumer mix of about 0.6% and 14% contribute to 28% and 31% of the total sales respectively.

Figure 1: Map of India - Telangana State Highlighted



2.2 Objectives and key outcomes of the 24x7 Power For All Joint Initiative

The 24x7 Power for All (24x7 PFA) is a Joint Initiative of Government of India (GoI) and Government of Telangana State (GoTS) with the objective to make 24x7 power available to all households, industry, commercial businesses, public needs, any other electricity consuming entity and adequate power to agriculture farm holdings.

Towards this goal the 24x7 PFA initiative seeks to:

1. Ensure reliable 24x7 supply to consumers within a period of four years of commencement of the program. The hours of supply for agriculture consumers will be decided by the State Government as per requirement.
2. Ensure that all unconnected households are provided access to electricity in a time bound manner in the next four years i.e. by end of FY 19.
3. Ensure adequate capacity addition planning and tie ups for power from various sources at affordable price to meet the projected power demand in future.
4. Strengthen the transmission and distribution network to cater to the expected growth in demand of existing as well as future consumers.
5. Assess the financial measures including optimizing investments and undertaking necessary balance sheet restructuring measures to ensure liquidity in the finances of the utility.
6. Put in place a strategy to ensure reduction of AT&C losses as per the agreed loss reduction trajectory and methodology and steps required to be taken at every level of distribution.
7. Identify steps for implementation and adoption of modern technologies to monitor reliable supply.
8. Identify steps for monitoring timely commissioning of various generating plants, transmission and distribution infrastructure to meet the expected growth in demand.
9. To take measures for meeting the performance standards as laid down by SERC.

An Action plan has been drawn to achieve the above aims and objectives. The plan will be executed by the State Government with the support of Government of India, wherever necessary, as per their approved plans, schemes and policies.

2.3 Methodology for Preparation of Action Plan for 24x7 Power For All

The methodology adopted to prepare the 'Action Plan' for 24x7 PFA includes inter-alia:

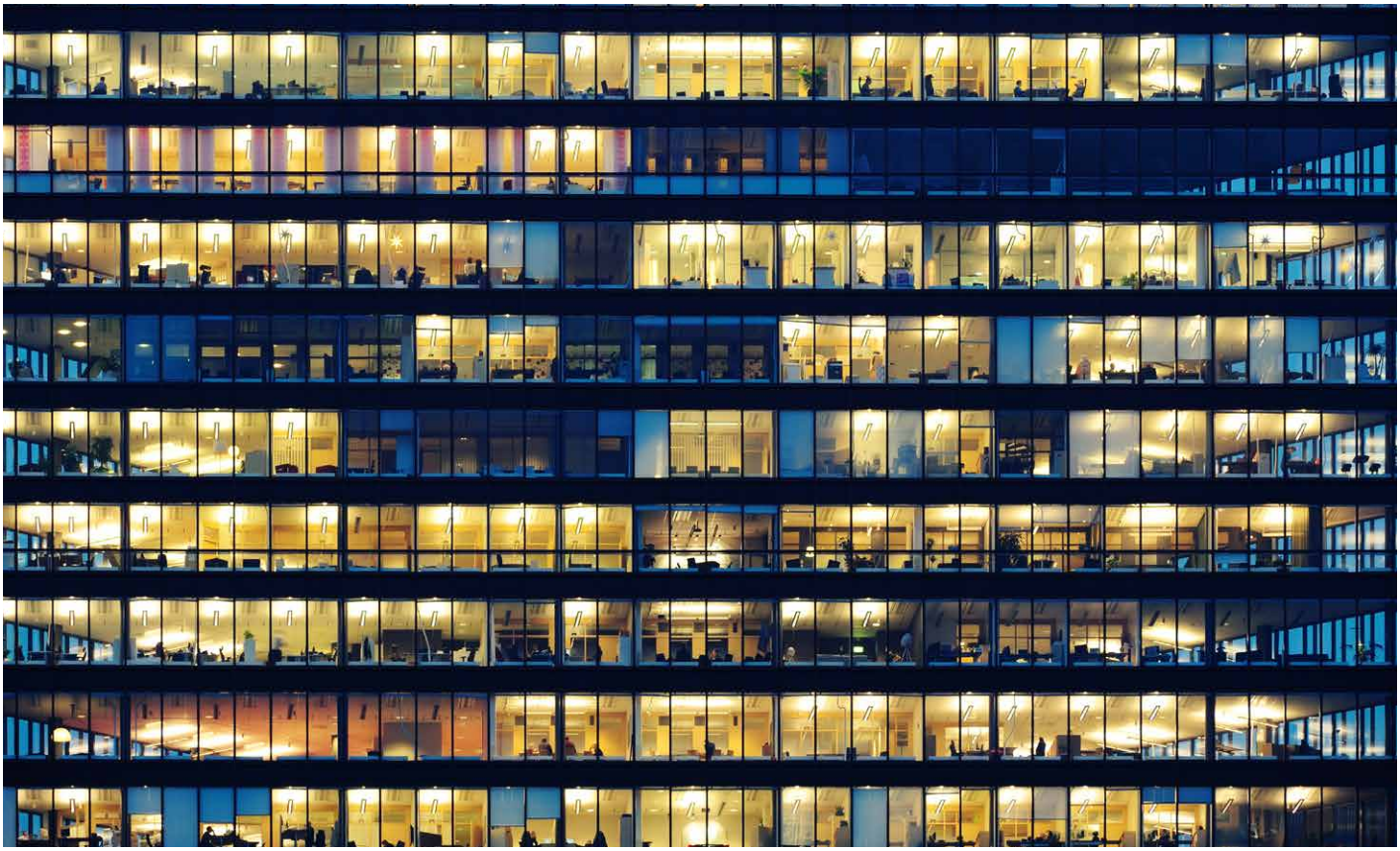
1. Projection of average per day consumption of rural and urban households based on respective historical compounded annual growth rates (CAGR) during the past five years
2. Assessment of the energy required from the existing, newly constructed households and newly electrified households assuming the yearly households additions and the electrification plan of the state taking into account of the aspiration index of consumers and the historic load reliefs
3. Projection of demand from other categories including commercial, industrial, agriculture, etc. historical CAGR adjusted with the proposed industrial additions and other state policies
4. Assess the energy requirement due to additional parameters like providing 24 hours supply to rural consumers, 9 hours of supply to agricultural consumers, additional loads due to Hyderabad Metro Rail, Lift Irrigation Schemes (LIS), Water Grid Projects and Bayyaram Steel Pant
5. Assessment of the generation through detailed capacity additions to meet power demand in future through
   - State's own upcoming generation stations
   - Central and other generating stations
   - Renewable energy sources
6. Assess the adequacy of the network - both inter-state and intra state transmission as well as distribution so as to meet the increased / expected / projected power requirement of all consumer categories of the state
7. Assessment of Financial Gap under multiple scenarios on various parameters like - no tariff hike and Power Purchase cost escalation, No Grants received from MoP, Additional 1% increase in AT&C Losses and nil accumulated losses as on 31st March 2015
8. Set monitorable targets to achieve the goal of 24x7 Power for All in a cost effective manner to the consumers of the State.

Key features of this document, which position it for success in achieving the PFA objectives include:

1. Comprehensive with measurable outcomes:
    a. The roadmap captures the as-is situation of the state, its strengths, weaknesses and opportunity areas and identify key gaps and constraints in achieving the 24x7 PFA objective
    b. As an outcome of the above assessment and analysis, the roadmap culminates into an action plan with measurable outcomes in terms of contribution to 24 x 7 PFA objective, against each action item/initiative.
    c. While the roadmap has identified an array of interventions required to meet the 24 x 7 PFA objective, it also prioritizes these interventions, given the various constraints such as funding and capabilities and hence the need to direct efforts to top priority action items
2. Continued state ownership and commitment:
    a. In order to avoid a situation where the PFA objectives take backstage amidst the state's other priorities, the roadmap has ensured continued participation of the various stakeholders throughout the preparation stage and the roadmap has formulated a communication framework to ensure such continued commitment for the implementation as well
    a. The roadmap proposes formulation of a PFA steering committee and an granular-level accountability matrix to discuss PFA progress, escalate issues and resolve them
3. Monitoring and review framework:
    a. The roadmap integrates an accountability matrix and monitoring and review framework which shall be adopted by the steering committee for issue resolution
    b. The steering committee will continuously engage with stakeholders across the power value chain for timely resolution of issues

Subsequent sections of this roadmap document discuss the state's strategy and action plan across generation, transmission, distribution, renewable energy, energy efficiency, IT and technology, performance improvement to achieve the PFA objective. Each sub-section of the report contains the following:

- As-is assessment
- Roll Out Plan with timelines
- Key issues and risk factors and their implications for achieving the PFA objective
- Support required from the GoTS as well as GoI for addressing the factors.



03. **Power Supply Position and Demand Projections**

3. Power Supply Position and Demand Projections

3.1 Power Supply Scenario

Energy deficit in Telangana for last three years was in the range of 4%-12%. Energy requirement in Telangana was 50,916 MU in FY 14-15, of which only 2,128 MU could not be met resulting in an energy deficit of nearly 4.2% with a maximum historic peak demand of 8,331 MW in 2014-15.

As can be seen from the table below, peak demand has increased by over 2,588 MW during the period FY 2008-09 till FY 2014-15 as against which peak met has increased by 1,345 MW.

Figure 2: Historical Power Supply Position of Telangana State in MU

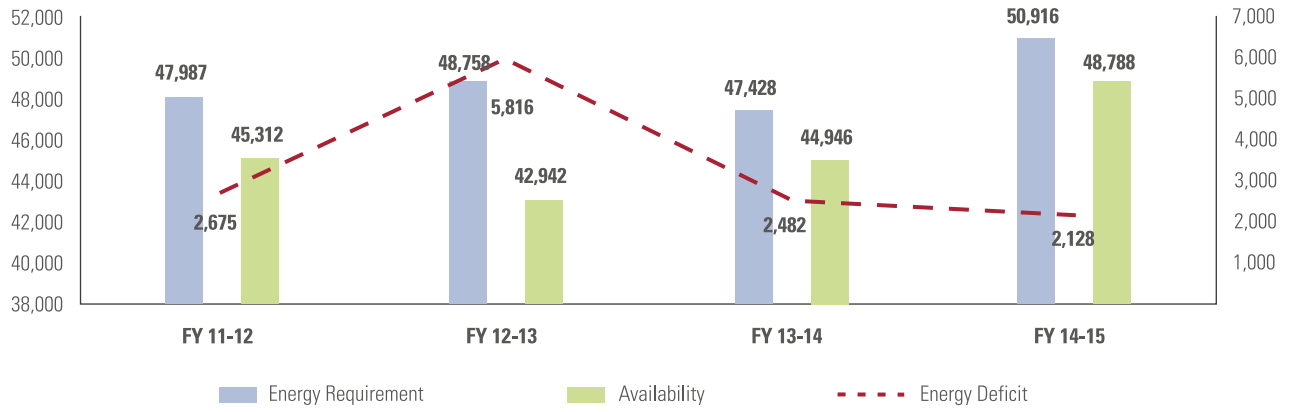


Table 3: Historical Power Supply Position in Telangana State

Period	Peak Demand (MW)	Peak Met (MW)	Peak Deficit/ Surplus (MW) (-/+)	Peak Deficit/ Surplus (%) (-/+)	Energy Requirement (MU)	Energy Availability (MU)	Energy Deficit/ Surplus (MU) (-/+)	Energy Deficit/ Surplus (%) (-/+)
2008-09	5,743	5,303	-440	-8%	31,883	30,348	-1,535	-4.8%
2009-10	6,263	5,655	-608	-10%	34,808	32,752	-2,055	-5.9%
2010-11	6,600	6,239	-361	-5%	36,490	35,802	-688	-1.9%
2011-12	6,866	6,461	-405	-6%	47,987	45,312	-2,675	-5.6%
2012-13	6,741	6,317	-424	-6%	48,758	42,942	-5,816	-11.9%
2013-14	7,876	7,177	-699	-9%	47,428	44,946	-2,482	-5.2%
2014-15	8,331	6,648	-1,683	-20%	50,916	48,788	-2,128	-4.2%

There was a 11% increase in the peak deficit in FY 2014-15 over FY 2013-14 attributable to the increased agricultural loads whereas the energy deficit has decreased by 1% attributable to the extensive short term market purchases which contributed to 21% of the total power purchased in FY 2014-15.

3.2 Demand Projections

Implementation of 24X7 supply across the State is likely to increase the electricity consumption substantially.

Various factors that have been considered for future energy projections include

- Demand from Domestic segment
- Agriculture supply from 7 hours to 9 hours in a day
- Implementation of LI Schemes
- Urban development in cities of Hyderabad, Warangal, Nizamabad and Karimnagar.
- Upcoming major projects such as Hyderabad Metro Rail, Hyderabad ITIR region
- Upcoming Bayyaram Steel Plant in 2016-17.

3.2.1 Domestic Demand

Projections of domestic demand have been undertaken by aggregating demand from the following categories

- Demand on account of power supply to already electrified households
- Demand on account of power supply to unelectrified households
- Demand from electrification of newly constructed households
- Demand from 24x7 supply to rural
- The year wise addition of households have been projected based on the historical compounded annual growth rates (CAGR) of the DISCOMs.

Table 4: Historic household data for Telangana State

Sr. No.	Particulars	2001 (Census) (units)	2011 (Census) (units)	Difference (units)	Decadal Growth (%)	CAGR (%)	Total H/H by 2014 as per DISCOMs (units)
1	Total Households	5,759,920	7,974,704	2,214,784	38.45%	3.31%	8,473,917
2	Rural Households	4,268,176	5,146,897	878,721	20.59%	1.89%	4,109,068
3	Urban Households	1,491,744	2,827,807	1,336,063	89.56%	6.60%	4,364,849
4	Total Electrified Households	4,538,390	7,331,105	2,792,715	61.54%	4.91%	7,707,797
5	Rural Electrified	3,103,845	3,850,217	746,372	24.05%	2.18%	3,387,480
6	Urban Electrified	1,434,545	3,480,888	2,046,343	142.65%	9.27%	4,320,317

3.2.1.1 Demand from electrified households

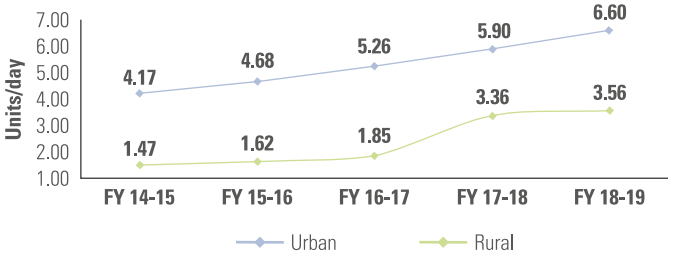
Improvement of supply as well as natural load growth will result in increase of the consumption levels in the hitherto electrified households. Historic values of per household consumption have been considered for projecting demand for next five years. Based on computed CAGR for per household consumption, overall consumption and additional consumption have been estimated.

The projections for the state of Telangana depict increase of household consumption from the current levels of 1.47 units/ day in FY 2014-15 to 3.56 units/ day in FY 2018-19 for in rural areas whereas it is expected to increase from 4.17 units/day in FY 2014-15 to 6.60 units/day in FY 2018-19 in urban areas

The projections have been made incorporating the expected increase in aspirational consumption level of the households with the improvement in the standards of living and the historic load reliefs thereby overcoming the comparatively low per capita consumption in the previous years and accordingly the growth rates have been changed.

Detailed demand projections from electrified households have been shown in Annexures.

Figure 3: Per Household Consumption Projections for Rural and Urban Areas for Telangana State



3.2.1.2 Demand from un-electrified households

Telangana DISCOMS plan to undertake 100% electrification of all households by FY 2017-18 in line with the PFA objectives. Hence state energy requirement is expected to increase in the coming years with the electrification of the Urban and Rural households by FY 2018-19 and detailed energy consumption projections have been showed in the Table 5.

The same has been taken into account while arriving at the total domestic demand of the state.

As on 31.3.2015 there are 44,532 urban and 721,588 rural households to be electrified in the state of Telangana.

Table 5: Electrification of households

Parameter	Units	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
URBAN						
Electrification of unelectrified Household	Nos.	-	15,000	15,000	14,532	-
Cumulative HH electrified	Nos.	-	15,000	30,000	44,532	44,532
RURAL						
Targeted Electrification of unelectrified	%		20%	40%	40%	0%
Electrification of unelectrified Household	Nos.	-	144,318	288,635	288,635	-
Cumulative HH electrified	Nos.	-	144,318	432,953	721,588	721,588
Total households electrified out of unelectrified	Nos.	-	159,318	303,635	303,167	-
URBAN						
Cumulative Annual Energy Requirement for Electrification of unelectrified Household	MUs	-	20	45	74	82
RURAL						
Cumulative Annual Energy Requirement for Electrification of unelectrified Household	MUs	-	85	270	764	810
Annual Energy Requirement for Electrification of unelectrified Household	**MUs**	**-**	**105**	**315**	**837**	**891**

3.2.1.3 Demand from electrification of newly constructed household

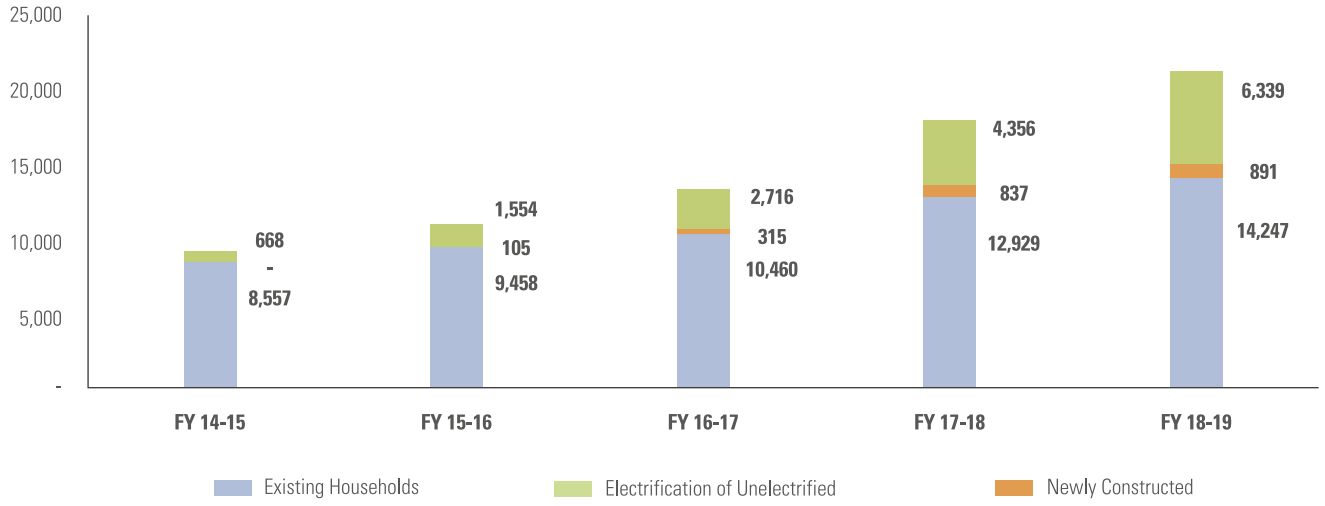
2011 census data has been adopted for estimating the number of households in 2011 and decadal CAGR (2001 vs 2011) has been applied in 2011 numbers to estimate the total number of households in the coming years. Energy requirement has been computed with the assumption of 100% electrification of all newly constructed households.

Table 6: Demand from electrification of newly constructed household

Parameter	Units	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
URBAN						
Yearly total urban households based on CAGR	Nos	4,770,021	5,212,804	5,696,691	6,225,496	6,803,389
Yearly cumulative Increase in Urban H/H as per State Govt.	Nos	405,172	847,955	1,331,842	1,860,647	2,438,540
RURAL						
Yearly total rural households based on CAGR	Nos.	5,056,336	5,136,987	5,219,469	5,303,826	5,390,103
Yearly cumulative Increase in Rural H/H as per State Govt.	Nos	78,862	159,513	241,995	326,352	412,629
Cumulative newly constructed households	Nos.	484,034	1,007,468	1,573,837	2,186,999	2,851,170
URBAN						
Cumulative Annual Energy Requirement (MUs) for newly constructed Household - Urban	MU	621	1,455	2,559	4,003	5,874
RURAL						
Cumulative Annual Energy Requirement (MUs) for newly constructed Household - Urban	MU	47	99	157	353	465
Cumulative Annual Energy Requirement for newly constructed Household	**MU**	**668**	**1,554**	**2,716**	**4,356**	**6,339**

The figure shows that energy consumption from the existing households contribute maximum in the domestic category followed by the newly constructed households thereby contributing to a 24% CAGR growth for domestic category.

Figure 4: Domestic Category Consumption Pattern for Telangana State



3.2.2 Demand from other category of consumers

The high CAGRs for the categories - Industrial, Agriculture and LIS, Traction and Aviation can be attributed to the additional sales on account of parameters like Bayyaram Steel Plant, 9 Hours of agricultural Supply, LI Schemes, Water Grid Projects and Hyderabad Metro Rail.

Detailed explanation has been provided in the following paragraphs.

Table 7: Sales from other category of consumers in MU

Category	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	CAGR
Commercial	4,230	4,572	5,054	5,591	6,189	9.98%
Industrial	13,619	12,960	16,670	20,571	24,688	16.03%
Agriculture and LIS	12,162	17,050	21,451	28,097	31,532	26.89%
Street Lighting, Townships	1,224	1,372	1,489	1,618	1,759	9.50%
Traction and Aviation	576	855	1,182	1,298	1,387	24.60%
Others	779	847	944	1,053	1,175	10.83%

Table 8: Base sales projections and additional load parameters for other than domestic consumers

Category	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Base Projections (MU)					
LT	25,600	28,437	31,766	35,649	39,963
HT	16,213	17,362	19,167	21,198	23,486
Total	**41,814**	**45,799**	**50,933**	**56,847**	**63,449**
Additional Loads (MU)					
HMR loads	-	131	421	497	545
LI Schemes	-	2,844	3,043	8,776	10,956
Water Grid Projects	-	-	-	237	788
9 Hrs of Agl Supply	-	-	3,694	3,842	3,996
Bayyaram Steel Plant	-	-	2,190	4,380	6,570
Total Additional Sales (MU)	**-**	**2,975**	**9,348**	**17,732**	**22,855**

3.2.3 Hyderabad Metro Rail (HMR)

25% CAGR in sales for Aviation and Traction consumer category can be attributed to the additional load due to Hyderabad Metro Rail which alone is growing at a CAGR of 61% (FY 2015-16 to FY 2018-19). 545 MU of energy would be required annually to operate Hyderabad Metro Rail by FY 18-19, once the project is fully operational.

3.2.4 Agriculture, LIS and Water Grid Projects

27% CAGR in sales for Agriculture and LIS consumer category can be attributed to the commitment of TSDISCOMS to increasing supply to agricultural category from the present 7 hours to 9 hours starting FY 2016-17 and extensive addition of LI Schemes and water grid projects.

Current supply for agricultural consumers is being given in 2-3 spells spread across day and night. Whereas, by 2018-19 DISCOMs intend to give 9 hours of supply by either giving 9 hours at a stretch during the day time or split into two spells with maximum time of supply during the day for 6/7 hours and remaining 3/2 hours during the night. Main objective of giving agricultural supply during the day is to reduce the fatalities due to electrocution in the State of Telangana. Telangana State plans to cater to this increase in demand especially during the day time, through 2000 MW Solar Generation.

Lift Irrigation Schemes (LISs) in tune of about 5,700 MW are planned in the state of Telangana to supply water for irrigation, drinking water and industrial purpose. Major schemes planned in the region - Pranahita-Chevella, Kalwakurthy, Komaram Bheema are expected to be operational 16 hours every day during August to November every year.

3.2.5 Bayyaram Steel Plant

16% CAGR in sales for industrial category can be attributed to Bayyaram Steel Plant which is expected to become operational in 2016-17 with energy requirement of 2,190 MU reaching its peak capacity in 2018-19 resulting in energy requirement of 6,570 MU.

3.2.6 Total Demand and Energy Requirement

As per the plan, the projected energy requirement of Telangana State is 105,974 MU (With additional 5% Reserve margin) by 2018-19 for Telangana and the anticipated peak load projected for FY 2018-19 would be around 19,053 MW.

Adoption of various energy efficiency measures like energy efficient irrigation pump-sets, energy efficient lighting (use of LEDs) and adopting demand side management would also help in reducing the peak demand of the state.

An assessment of the adequacy of generation, transmission and distribution infrastructure for meeting the projected peak demand of around 19,053 MW has been made which is covered in the following chapters.

Table 9: Telangana State Consolidated Sales Projection (FY 14-15 to FY 18-19)

Parameters	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Base Sales (MU)	41,814	45,799	50,933	56,847	63,449
Additional Sales (MU)	-	2,975	9,348	19,502	24,761
Total Sales (MU)	**41,814**	**48,774**	**60,281**	**76,349**	**88,210**
Transmission Loss (%)	4.15%	4.10%	4.05%	4.00%	3.95%
AT&C Loss (%)[2]	12.61%	11.46%	10.95%	9.70%	9.01%
T&D Loss (%)	16.24%	15.09%	14.56%	13.31%	12.60%
Energy Requirement at grid level (MU)	49,920	57,441	70,554	88,071	100,928
Reserve Margin (MU)[3]	996	2,872	3,528	4,404	5,046
Energy Requirement (MU)	**50,916**	**60,313**	**74,081**	**92,475**	**105,974**
Peak Load (MW)[4]	**8,331**	**10,276**	**13,645**	**15,995**	**19,053**

2 With 100% collection efficiency for both the DISCOMs considering only distribution losses.

3 Reserve Margin: 5% of the energy requirement at grid level (FY 2014-15 Actuals). Reserve margin is not considered for arriving at PP cost or for calculating revenue from sales.

4 Peak load is calculated based on hourly load curve analysis which incorporates effective flattening of load curves

04. **Generation Plan**

4. Generation Plan

4.1 Existing Generation Capacity

Energy availability from existing sources as on FY 2014-15 was about 48,788 MU inclusive of market purchases and coal-based power from long-term sources constituted nearly 66% of energy availability.

Figure 5: Actual energy availability for Telangana State for FY 2014-15

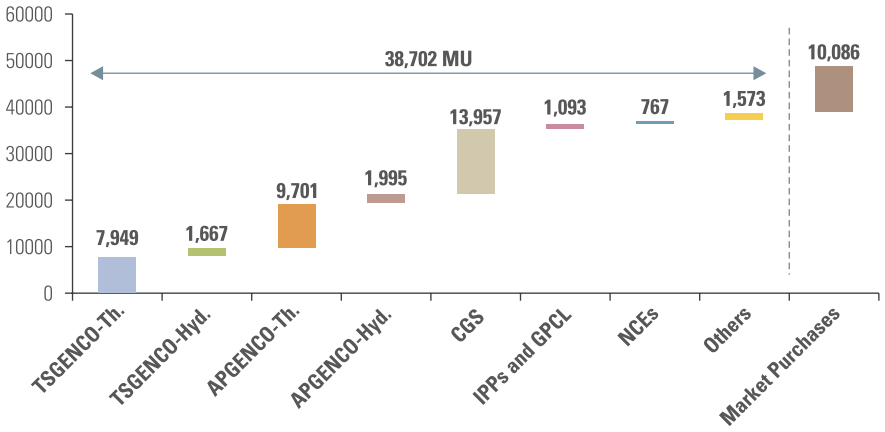
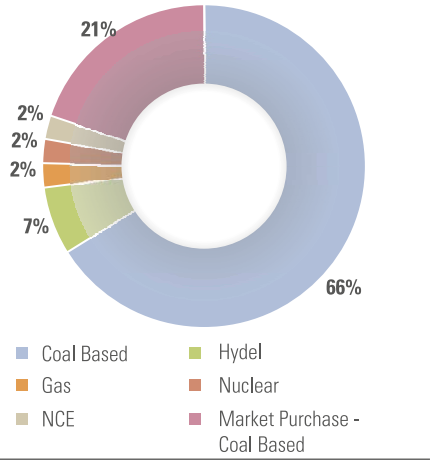


Figure 6: Energy Mix by source for FY 2014-15

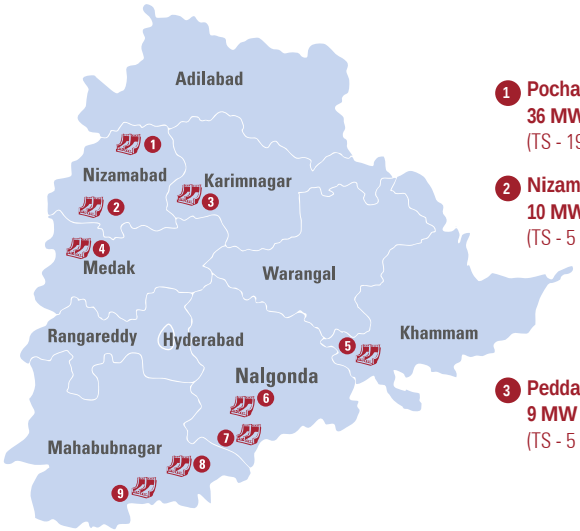


4.1.1 State Generating Stations

For Telangana State the total installed capacity available of as on March 2015 from state generating stations of TSGENCO and APGENCO is 4,808 MW. The share for Telangana State has been calculated based on the Government Order G.O.Ms. No.20 in which on bifurcation, Telangana State has been allocated a share of 53.89% of the existing generating stations and post expiry of existing Power Purchase Agreements (PPA) no capacity will be available from APGENCO Stations and 100% capacity will be available from TSGENCO Stations.

Energy available from all sources of generating stations have been arrived by using appropriate Plant Load Factors (PLFs) and Auxiliary consumptions of the generating stations amounting to a total of 48,788 MU for FY 2014-15amount of energy available for the State of Telangana from all generating sources is 48,788 MU for FY 2014-15 which is inclusive of market purchases.

Current capacity of TSGENCO Thermal and Hydel Generating Stations is 2,282 MW and 2,082 MW respectively.



1 **Pochampad**
36 MW
(TS - 19 MW)

2 **Nizam Sagar**
10 MW
(TS - 5 MW)

3 **Peddapalli MHS**
9 MW
(TS - 5 MW)

1 **Ramagundam**
62.5 MW
(TS - 34 MW)

2 **KTPP**
1 x 500 MW
(TS - 269 MW)

3 **KTPS**
720 MW
(TS - 129 MW)

4 **Kothagudem TPS**
Stage V & VI
1000 MW
(TS - 539 MW)

4 **Singur**
15 MW
(TS - 8 MW)

5 **Paleru**
2 MW
(TS - 1 MW)

6 **NS Left Canal**
60 MW
(TS - 32 MW)

7 **Nagarjuna Sagar**
816 MW
(TS - 440 MW)

8 **Srisailam LB**
900 MW
(TS - 485 MW)

9 **Priyadarshini JHEP**
234 MW
(TS - 126 MW)

PLFs for State GENCO Thermal Power Stations have been assumed to be 80% and for Hydel Power Stations it varies in the range of 20-40%. For Central Generating Station the PLF has been assumed to be 80% but however due to unavailability of gas, PLF of less than 40 % has been assumed for gas powered generating stations. For NCEs; a PLF of 20% has been assumed Solar and Wind Generating Stations respectively.

Table 10: Existing Capacities from State GENCO

Generating Station	Installed Capacity (MW)	TS Share Capacity (MW)
TSGENCO Thermal Stations	2,283	1,230
TSGENCO Hydel Stations	2,083	1,122
APGENCO Thermal Stations	2,810	1,514
APGENCO Hydel Stations	1,747	941
Total	**8,923**	**4,807**

4.2 Central and other generating stations

4.2.1 Central Generating Stations

Telangana State has been allocated power from existing Central Generating Stations (CGS) including NTPC SR and ER, NTPC Simhadri, Neyveli Lignite Corporation Ltd (NLC), Nuclear Power Corporation of India Ltd (NPC) and Vallur Thermal Power Plant contributing to 29% of the total energy available in FY 2014-15.

Table 11: Existing Central Generating Stations

Generating Station	TS Share Capacity (MW)
NTPC SR	457
NTPC ER	216
NTPC Simhadri	787
NLC	172
NPC	174
Vallur Thermal Power Station	119
Total	**1,925**

4.2.2 IPPs and Gas Power Corporation Limited

Gas based generating station contribute to only 2% of the total energy available from existing generating station in FY 2014-15.

Table 12: Existing IPPs and Gas Based Generating Stations

Generating Station	TS Share Capacity (MW)
GPCL	32
GVK	117
Spectrum	112
Kondapalli (Gas)	195
BSES	119
Total	**575**

4.2.3 Renewables and other generating stations

Renewables and other private generating station contribute to only 5% of the total energy available while market purchases contribute to 21% in FY 2014-15.

Table 13: Renewables and Other Generating Stations

Generating Station	TS Share Capacity (MW)
Solar	119
Wind	400
Bio Mass	46
Bagasse	72
Others	26
KSK Mahanadi (Medium Term)	216
Market Purchases	900
Total	**1,779**

4.3 Upcoming Generating Stations

4.3.1 State owned Generating Stations

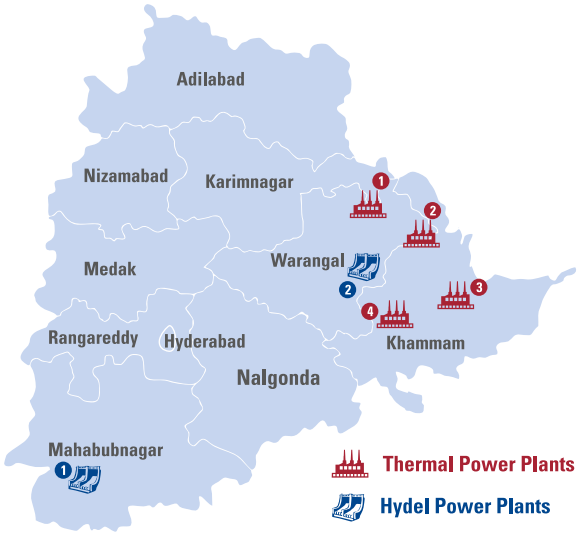
In order to meet the increasing demand of power while providing 24 x 7 Power For All, Telangana State is planning for an additional 6,480 MW through Thermal Power Stations in Damarcherla, Manuguru, Kothagudem and Warangal of which Kakatiya Thermal Power Plant Stage II is already under construction and is expected to be commissioned by September 2015 and 360 MW through Hydel Power Stations.

Table 14: Capacity Additions Planned by TSGENCO for the control period FY 14-15 to FY 18-19

Generating Stations	Existing Capacity (MW)	Capacity Addition (MW)	Total (MW)
Thermal Power Stations	2,283	6,480	8,763
Hydel Power Stations	2,082	360	2,442
Total	**4,365**	**6,840**	**8,805**

Table 15: TSGENCO Capacity Additions that are planned to be commissioned by FY 2018-19

TSGENCO Generating Station	Capacity (MW)
Kakatiya Thermal Power Plant Stage II	600
KTPS Stage VII	800
Manuguru TPP Unit 1	270
Manuguru TPP Unit 2	270
Manuguru TPP Unit 3	270
Manuguru TPP Unit 4	270
Damarcherla TPP	4,000
Lower Jurala HEP	240
Pulichintala HEP	120
Total	**6,840**



1. Lower Jurala HEP (240 MW) (TS - 240 MW)
2. Pulichintala (120 MW) (TS - 120 MW)

1. Kakatiya TPS Stage 2 (600 MW) (TS - 600 MW)
2. Manuguru TPS (4 x 270 MW - TS)
3. KTPS Stage 7 (800 MW - TS)
4. Damercherla TPS (5x800 MW - TS)

4.4 Central and Other Generation Plans

4.4.1 Central generating Stations

Telangana State is expected to procure additional power of 4,733 MW from Central Generating Stations which are planned to be commissioned during next five years. Expected power supply from CGS plants is as mentioned in Table 16.

Table 16: Telangana Share in CGS Capacity additions

Generating Station	Capacity (MW)	Contracted Capacity with TSDISCOMS (MW)
Tuticorin Unit 1	500	69
Tuticorin Unit 2	500	69
Kalpakkam	500	71
Kundamkulam Unit 2 (NPCIL)	1,000	50
Kudigi Unit 1	800	75
Kudigi Unit 2	800	75
Neyveli New TPP Unit 1	500	36
Kudigi Unit 3	800	84
Neyveli New TPP Unit 2	500	36
Kudigi Unit 4,5	800	168
NPTC UMPP	-	4,000
Total	**6,700**	**4,733**

4.4.2 Other Long-Term Sources

In order to meet the growing demand, Telangana State also plans to procure power of 4,819 MW from other long-term sources which also includes Power from upcoming Singareni Power Plant - Stage 2.Power supply from long-term sources is as mentioned in Table 17

Table 17: Power supply from Private Sources

Generating Station	Contracted Capacity of TSDISCOMS (in MW)
Singareni Stage 1	1,200
Thermal Power Tech	269
Chhattisgarh Power Plant (Long Term MoU)	2,000
Long Term Bidding - DBFOO	750
Singareni Stage 2	600
Total	**4,819**

4.4.3 Renewable Energy

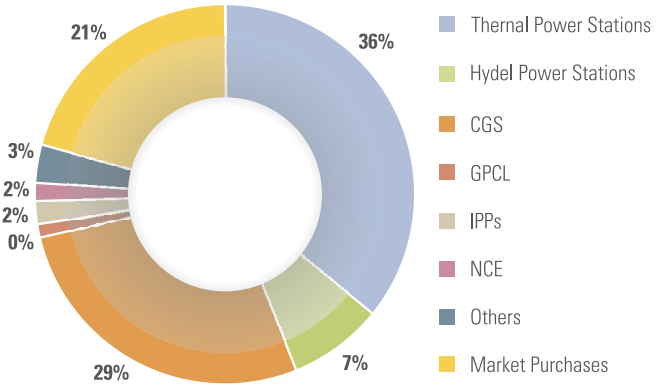
Rise in agricultural demand is planned to be served using Renewable sources, more specifically using the solar power generation. Total renewable capacity additions as planned by Telangana State is 6,016 MW by 2018-19 as mentioned in Table 18.

Table 18: Renewable Capacity additions

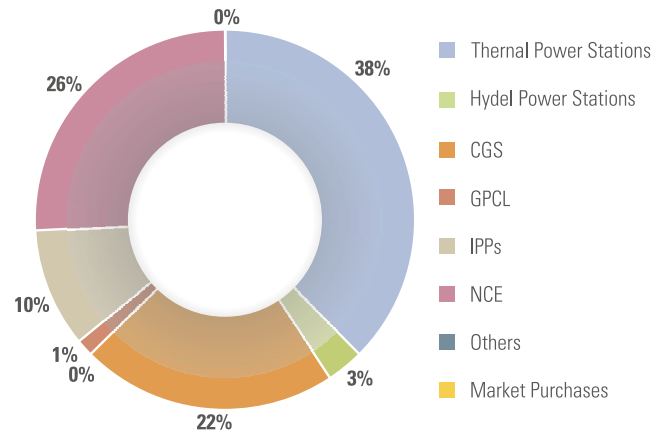
Source	Capacity (MW)
NCE-Solar Competitive Bidding Upcoming in FY 15-16	550
NCE-Solar Competitive Bidding Upcoming in FY 16-17	2,366
NCE-Solar Parks/ Solar Zones Upcoming in FY 17-18	1,700
NCE-Solar Parks/ Solar Zones Upcoming in FY 18-19	1,400
Total	**6,016**

With the above mentioned capacity additions Telangana State will have a cumulative of 22,408 MW from all upcoming sources by FY 2018-19. Also, by FY 2018-19 more than 35% of the total energy available is from State Generating stations followed by Other Generating Stations (26%) and Central Generating Stations (22%).

Figure 10: Energy Availability mix comparison for Telangana State FY 2014-15 and FY 2018-19



2018-19



Keeping in view the requirement, an assessment of the adequacy of Generation, Transmission and Distribution infrastructure has been done to meet the projected demand and the same are covered in the subsequent chapters in detail.

4.5 Demand Supply Position

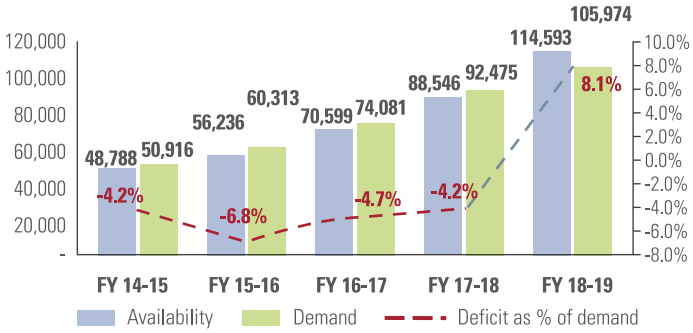
4.5.1 Demand Supply Projections

While arriving at the demand supply projections in base case energy availability from the upcoming stations have been assumed as per the Commercial Operational Dates. The energy requirement has been computed incorporating suitable growth rates and it includes demand from additional parameters like LI Schemes, Water Grid Projects, 9 Hours of Agricultural Supply from FY 2016-17, 24 Hours of rural supply from FY 2017-18 and Hyderabad Metro Rail Loads. Based on these parameters the State of Telangana is expected to be surplus by 8,604 MU by FY 2018-19.

Table 19: Demand Supply Scenario for Telangana State

Parameter	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Availability	48,788	56,236	70,599	88,546	114,593
Demand	50,916	60,313	74,081	92,475	105,974
Deficit as % of demand	-4.2%	-6.8%	-4.7%	-4.2%	8.1%
Deficit/ Surplus	**-2,128**	**-4,076**	**-3,482**	**-3,928**	**8,619**

Figure 11: Demand Supply Projections of Telangana State



In the above figure, the energy requirement is expected to double in the FY 2018-19 to that of the current Requirement in FY 2014-15 after taking into account all the parameters involved in providing 24 x 7 Power For All in the State of Telangana.

In the above scenario the state Telangana is expected to be Energy Surplus in the year FY 2018-19 on the assumption that all the generation plants are operational as per their scheduled Commercial Operation Dates.

4.6 Peak Demand Analysis

4.6.1 Peak Demand Projections

Entire Generation, Transmission and Distribution system needs to be equipped in order to be able to handle the peak demand which would be occurring during the day owing to multiple schemes planned by Telangana State. Out of the major schemes planned, Peak demand would majorly vary depending on 9 hours of agricultural supply and upcoming LI schemes for 16 hours a day.

Based on current scenario, total demand from agricultural supply for Telangana State is 6,710 MW which is given in two spells spread across 2/4 groups for TSSPDCL and TSNPDCL. Because of staggering of loads the average agricultural demand met at any point in time is in the range of 1,800 MW to 2,300 MW in Telangana.

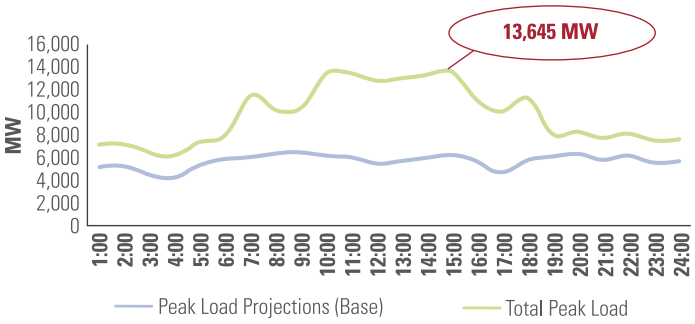
4.6.1.1 Peak demand in FY 2016-17

In FY 2016-17, along with 9 hours of agricultural supply, LI Schemes would have demand of 1600 MW, Bayyaram steel plant would be partly commissioned with a demand of 250 MW and HMR would have demand of 124 MW. If 9 hours of day-time agricultural supply were to be supplied, the following spells needs to be adopted

- Spell 1: 6 am to 3 pm
- Spell 2: 9 am to 6 pm

There is an overlap in supply hours from 9 am to 3 pm and the agricultural demand during this period is expected to be 6,500 MW to 7,000 MW. Hence the transmission and distribution network needs to be planned to cater to this peak demand. Additional power needs to be procured from other sources during to meet the demand during the overlap period. Peak demand with the plan would be 13,645 MW.

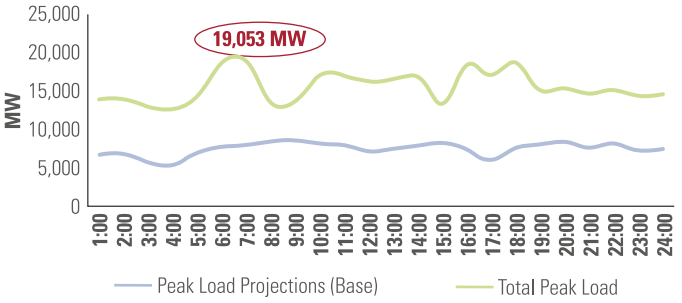
Figure 12: Peak Load for FY 2016-17



4.6.1.2 Peak Demand for FY 2018-19

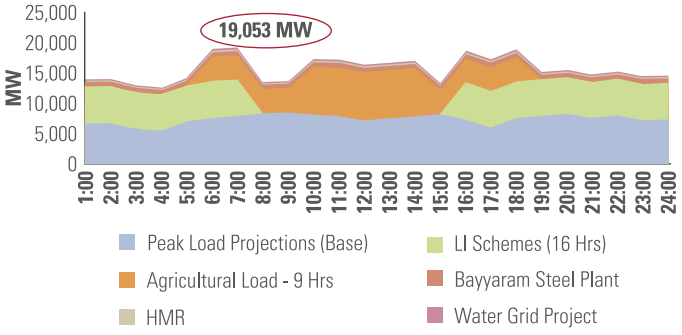
By FY 2018-19, all the schemes planned by the Telangana State would become operational resulting in a high peak demand of 19,053 MW. Demand from 9 hours agricultural supply would be around 8000 MW, Demand from Bayyaram Steel plant would be 750 MW, LI schemes would be around 6000 MW, 163 MW demand from HMR and 180 MW demand from the water project.

Figure 13: Peak Load for FY 2018-19



In order to flatten the load curve LI Schemes have been schedule to be operational during 16:00 Hours to 07:00 Hours. The detailed analysis of the loads which contribute to the peak loads are shown below.

Figure 14: Peak Load Break Up for FY 2018-19



4.7 Road Map for Generation Plan

As seen in the figure above, demand is reaching its peak in day time, which can be attributed to the overlap of agricultural supply and LI schemes resulting in peak demand of 19,053 MW.

As seen in the Table 20, total power available by FY 2018-19 would be 29,657 MW from diverse sources and it is very crucial to plan power supply to avoid deficit during the peak demand.

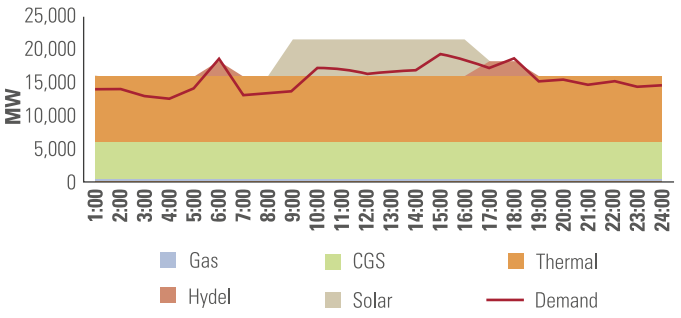
To meet the peak demand, power supply can be planned as mentioned in Figure 15 by using thermal plants from TSGENCO, APGENCO, CGS, IPPS and Other private generators as the base load which can be supplemented by Solar during the day time and by Hydel Stations during peak load.

Table 20: Installed Capacity of Telangana Share

All units in MW	Telangana Share – Installed Capacity		
	FY 2014-15	Upcoming	FY 2018-19
Thermal - TSGENCO	1,230	6,480	8,763
Thermal - APGENCO	1,514		
CGS	1,925	4,733	6,658
Hydro – TS/APGENCO	2,064	360	2,443
Gas	32		32
IPPS	1,350		807
Others	216	4,819	4,819
Solar	119	6,016	6,135
Wind	400		
NCE-Others	144		
Market Purchases	900		
Total	**9,894**	**22,408**	**29,657[5]**

5 After incorporating no share from APGENCO stations and PPA expiry of generating stations

Figure 15: Demand Supply Comparison for FY 18-19



4.8 Key Issues

4.8.1 Issues Regarding Coal Procurement

Currently TSGENCO plants are totally dependent on the domestic coal. Coal linkage of TSGENCO plants for coal supply is mentioned in the table below. It can observed that there is a shortage of 9% in coal supply as against the coal requirement of plants accounting for total shortage of 2.49 MTPA coal. There is a high risk that production in SCCL may come down in the future as can be seen from the recent production trends.

There is severe coal shortage for the existing plants and considering the numerous additions planned to meet future demand this shortage can be assumed to increase to a higher value. Keeping this in view, TSGENCOs need to explore other possibilities to procure coal.

Table 21: Coal Linkage status of TS GENCO plants

Sr. No.	Thermal Power Station	Installed Capacity (MW)	Linkage (MTPA)	Source	Requirement (MTPA)	Short Fall (MTPA)
1	Kothagudem A,B &C	720	3.70	SCCL	4.83	1.13
2	Kothagudem Stage V	500	2.20	SCCL	2.97	0.77
3	Kothagudem Stage VI	500	2.31	MCL	2.53	0.22
4	Kakatiya Stage I(KTPP)	500	2.16	SCCL	2.46	0.30
5	Ramagundam B	62.5	0.30	SCCL	0.37	0.07
	Total	**2282.5**	**10.67**		**13.16**	**2.49**

4.8.2 Lower PLF

TSGENCO stations are required to perform at 90% PLF (gross generation), to enable Telangana to achieve 'Power for All'. But, the stations of TSGENCO are not able to generate to optimum limits due to fuel constraints. PLF of TSGENCOs for FY 2013-14 has been mentioned in the table below.

As mentioned in the table, current PLF of TSGENCO plants which is 74.5% is far less compared to the required PLF to achieve 24x7 power for all. Low PLF can be majorly attributed to shortage in availability of domestic coal. Considering the current coal scenario and the future plant additions planned for next 5 years require interventions from Govt. of India, to enable 24x7 supply in Telangana.

Table 22: PLF of TSGENCOs

Sr. No.	Station	FY 13-14 (%)
1	Kothagudem - A	73.7
2	Kothagudem - B	72.2
3	Kothagudem - C	58.0
4	Kothagudem - V	82.6
5	Kothagudem - VI	77.6
6	Kakatiya – I	72.0
7	Ramagundam – B	81.4
	Average	**74.5**

4.8.3 MoE&F and other clearances for upcoming stations of TSGENCO

Table 23: Status of clearances for upcoming generating stations of TSGENCO

Clearances	KTPS	Manuguru	Damercherla
DPR	Completed	Completed	Completed
Water Allocation	The State Govt. has accorded approval for drawl of 0.80 TMC of water per year at the rate of 25 Cusecs from Godavari river	The state Govt, has allocated for drawl of 1.40 TMC of water per year at the rate of 45 Cusecs from Godavari river	I&CAD Department, GoTS for allocation of 208 Cusecs (6.60 TMC per year) of water from Krishna river
Coal Linkages	The proposal for issue of coal linkage for 4.72 million tonnes per annum has been sent to Ministry of coal	Long term Coal linkage to be established.	Long term Coal linkage to be established
MoE&F Clearances	Issued	To be obtained	Clearance awaited
AAI Clearances	NOC Obtained	Clearance awaited	NOC to be obtained

4.8.4 PPAs due to expire in the next 5 years

Some of the existing PPAs of TSDISCOMS with generators would expire during the next 10 years. Currently, Telangana is entitled to 53.89% of power from TSGENCO and APGENCO stations. Post expiry of PPA, no capacity would be available from APGENCO stations while 100% capacity of TSGENCO plants would be available to Telangana.

Table 24: PPAs due to expire in the next 5 years

Generating Stations	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Thermal Power Stations					
VTPS I					Mar-19
VTPS II					Mar-19
VTPS III					Mar-19
RTPP I					Mar-19
Hydel Power Station					
SSLM					Mar-19
NSRCPH					Mar-19
PABM					Mar-19
IPPS					
GVK		Jun-15			
Spectrum			Apr-16		
Kondapalli (Naphtha)		Oct-15			
Kondapalli (Gas)		Oct-15			
BSES				Oct-17	
Others					
LVS				Oct-17	
KSK Mahanadi (MT)			Jun-16		
Market Purchases					
Bilateral Purchases			May-16		
NTPC-Jhajjhar-Unallocated Share			May-16		

NTPC Ramagundam-II

Post expiry of PPA with NTPC Ramagundam-I on 30th April 2010, DISCOMS reached an arrangement for supply of power to them on same terms and conditions of expired PPA till generation is possible. TSDISCOMS can follow similar approach for PPA with NTPC Ramagundam-II, which is due to expire by 31st March 2016. This would ensure continued availability of 2,000 MU annually to Telangana state.

KSK Mahanadi (Case-I Medium Term)

PPA of TSDISCOMS with KSK Mahanadi is due to expire in June 2016. TSDISCOMS need to initiate a discussion with KSK Mahanadi for renewing the PPA on favorable terms. This would ensure continued annual availability of 1,570 MU.

4.8.5 Power Purchase Costs

The power purchase cost accounts for 83% of the total expenditure of distribution companies in FY 2014-15. Such high PP cost per unit coupled with additional power purchase requirements in view of meeting growing demand further constraints the financial position of DISCOMS adversely impacting their ability to fund new PP requirements.

Total Energy availability of Telangana State i.e., 48,788 MU during 2014-15 is majorly coming from State owned Thermal Plants - 36%, CGS - 29%, Market Purchase - 21 %. Market Purchases have major share in the current availability resulting in Average Power Purchase cost of Rs 3.79 per Unit.

Based on planned capacity additions by 2018-19, requirement for Market Purchases would become zero. Though Power Purchase Cost from Market Purchases would decrease, it would be balanced by rise in NCEs availability leading to modest increase in Average Power Purchase Cost from Rs 3.79 per Unit in FY 2014-15 to Rs 4.48 per Unit by FY 2018-19 as mentioned in table below.

Key Assumptions include:

- FY 2014-15 Actuals
- Escalation of per unit charges by 3% from FY 16-17

Includes all the capacity additions planned.

Table 25: Power Purchase Cost Projections

Power Purchase Cost (Rs/kWh)	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
State Thermal Plants	3.70	4.08	4.22	4.28	4.40
State Hydel	1.73	2.11	2.36	2.43	2.50
CGS	3.27	3.44	3.61	3.81	4.27
APGPCL	3.25	3.39	3.49	3.59	3.70
IPPS	5.50	3.93	4.63	4.85	5.12
NCEs	4.75	4.90	6.02	6.02	6.02
Others	3.82	3.74	3.94	4.27	4.36
Market Purchases	5.18	5.94	6.12		

Table 26: Power Purchase Cost

	Units	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Total Power Purchases	MU	48,788	56,236	70,599	88,546	114,593
Total PP Cost	Rs Crs	18,502	22,760	29,010	38,094	51,312
Average PP Cost	**Rs/kWh**	**3.79**	**4.05**	**4.11**	**4.30**	**4.48**

4.9 Adequacy of the Generation System

As mentioned in previous sections, total Peak Demand for Telangana State would be 19,053 MW by FY 2018-19.

To be able to handle the peak demand, Telangana State has planned huge generation capacity additions through Thermal, Hydel and Renewables. If all the capacity additions are operational as planned, then Telangana State would have total 29,657 MW of power (excluding market purchases).

Since the power generated is injected at 33 kV (Solar) and above, the system is adequate to handle the loads.

Table 27: System Adequacy at a glance for Generation

Voltage Level	Generation Adequacy
400 kV	✓
220 kV	✓
132 kV	✓
33 kV	✓
11 kV	-
LT	-

4.10 Action Plan for TSGENCO

Measures to be taken up by TS GENCO plants to increase the PLF

- Ensure coal linkage materialization: 100% of materialization of linkage coal from SCCL and MCL should be ensured.
- Undertake coal auditing at all 3 stages i.e. loading, transportation and unloading to ensure GCV of coal received is as per standards
- Improve blending infrastructure and bring in more scientific methods for blending
- Implement IT-enabled tracking mechanism for monitoring coal stock availability, coal shortfall, coal linkage materialization and coal dispatch from mines
- Timely commissioning of the upcoming plants

With the above mentioned steps TSGENCO plants could benefit from improvement in PLF from the current 80% to 90% and this will lead to considerable improvement in availability.

4.10.1 Measures to improve PLF and Energy Availability of the TSGENCO plants

Key issue that TS GENCO plants have been facing is related to fuel which has caused plants to operate at lower PLF as compared other plants.

4.10.2 Coal Requirement for generating stations

To meet the increasing demand in the state it is very critical that the coal fired generating stations to have sufficient amount fuel to operate at the expected PLF and the coal blocks have to be allocated to these stations based on their capacity.

From the table below it is evident that there is significant shortage of coal affecting the overall generation scenario.

In the upcoming power plants, KTPP-2 was originally linked to Tadicherla-I coal block which got cancelled. However TSGENCO applied for allotment of Tadicherla-I coal block and it is highly likely that this 2.5 MTPA would be available for KTPP-2. The SCCL stage-1 units would get this 5.8 MT allotted to them from their SCCL mines. The upcoming thermal plants - Manuguru, KTPS VII and Damercherla totaling to more than 6000 MW don't have coal linkage. The coal deficit would be reaching 17.4 MT by FY 2018-19 amounting to 57% of the total requirement. If coal required for these upcoming plants is not sourced on time, then availability of these upcoming plants would be questionable and hence might result in deficit.

Table 28: Coal Requirement in MTPA for TSGENCO Stations

Generating Stations	Capacity (MW)	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Existing TSGENCO	2,282	11.8	11.8	11.8	11.8	11.8
Kakatiya Thermal Power Plant Stage II	600	-	1.7	3.0	3.0	3.0
KTPS Stage VII	800	-	-	-	1.3	3.9
Manuguru TPP	1,080		-	1.8	5.3	5.3
Damarcherla TPP	4,000		-	-	-	6.5
Coal requirement in MTPA		11.8	13.6	16.6	21.4	30.6
Coal availability in MTPA		10.7	10.7	10.7	13.2	13.2
Coal Shortage in MTPA		**1.1**	**2.9**	**5.9**	**8.2**	**17.4**

4.11 Fund Requirement

Estimated project cost for under construction and future projects will be Rs. 42,491 Cr. Presently, the cost of the projects is financed through 80:20 Debt Equity Ratio in which up to 80% Debt is financed through loans from the Financial Institutions.

As it can be seen from the table below, equity infusion required for the projects is Rs 8,068 Crores and out of the total Rs 8,068 Crores for projects under development, Rs 200 Crores for KTPP which is under construction is high priority.

Table 29: Investments Planned by GENCO for the upcoming generating stations

Sr. No.	Name of the Project	Project Cost	Debt (Upto 80% of project cost balance is equity)	BE FY 14-15	BE FY 15-16	BE FY 16-17	BE FY 17-18
1	Kakatiya TPP Stage-II (1x600 MW)	3,652		200	0	0	0
2	Kothagudem TPS Stage-VII (1x800MW)	5,548	4,321	300	500	200	227
3	Bhadradri TPS (4x270 MW)	7,291	5,850	200	500	350	391
4	Damarcherla Thermal Power Plant Station (5x800 MW)	26,000	20,800		1,000	2,100	2,100
	Total	**42,491**	**30,971**	**700**	**2,000**	**2,650**	**2,718**

4.12 Generation Roll Out Plan

In the coming years the state of Telangana is expected to add about 22,408 MW from all sources of generating stations by end FY 2018-19 resulting in which the state is expected to be energy surplus by FY 18-19.

Table 30: Commercial Operation Dates and the capacity additions of the generating stations in the next 5 years

Generating Stations	Capacity MW	FY 15-16	FY 16-17	FY 17-18	FY 18-19
TS GENCO Thermal Stations					
Kakatiya Thermal Power Plant Stage II	600	600			
KTPS Stage VII	800			800	
Manuguru TPP	1,080		1,080		
Damarcherla TPP	4,000				4,000
TS GENCO Hydel Stations					
Lower Jurala HEP	240	240			
Pulichintala HEP	120	120			
Central Generating Stations (Contracted Capacity with TSDISCOMs)					
Tuticorin Unit 1	69	69			
Tuticorin Unit 2	69	69			
Kalpakkam	71	71			
Kundamkulam Unit 2 (NPCIL)	50	50			
Kudigi Unit 1	75		75		
Kudigi Unit 2	75		75		
Neyveli New TPP Unit 1	36			36	
Kudigi Unit 3	84			84	
Neyveli New TPP Unit 2	36				36
Kudigi Unit 4,5	168				168
NPTC UMPP	4,000				4,000
NCE					
Competitive Bidding – Phase 1	550	550			
Competitive Bidding – Phase 2	2,366		2,366		
Solar Parks/ Solar Zones – Phase 1	1,700			1,700	
Solar Parks/ Solar Zones– Phase 2	1,400				1,400
Other Generating Stations					
Singareni Stage 1	1,200	1,200			
Thermal Powertech	269	269			
Chattisggarh Power Plant	2,000		2,000		
DBFOO	750	750			
Singareni Stage 2	600				600
Total (in MW)	**22,408**	**3,988**	**5,597**	**2,620**	**10,204**

4.13 GoI Interventions

Key interventions are expected to improve energy availability and reduce energy deficit in the coming years. Key GOI interventions are requested in the following areas:

1. TSGENCO has applied for allotment of Tadicherla coal block for KTPP as per MoC notification. This be may awarded expeditiously
2. Linkage to other projects of Manuguru, Kothagudem and Damarcherla may be awarded expeditiously
3. Expeditious MOEF clearances
4. Expeditious commissioning of NTPC UMPP on or before Dec 2018 so as to meet the requirements of Power For All program.

Though, Govt of India would make all possible efforts within the framework/ policies to assist the Govt of Telangana as requested above, the State government would put in place a back-up plan to procure adequate power to meet the requirement in the event of any contingency.

05. **Transmission Plan**

5 Transmission Plan

5.1 Current Transmission Network

Transmission sector of Telangana is amongst the high-performing utilities in the country, with transmission losses in FY 2013-14 at 3.59% and transmission system availability as high as 99.94%. Transmission losses have seen an impressive downtrend from 4.50% in 2010-11 to 3.59% in FY 2013-14. Key features of transmission system in the state as on 31st March 2015 are presented in the figure below

Figure 16: Key transmission network status as on 31st March 2015

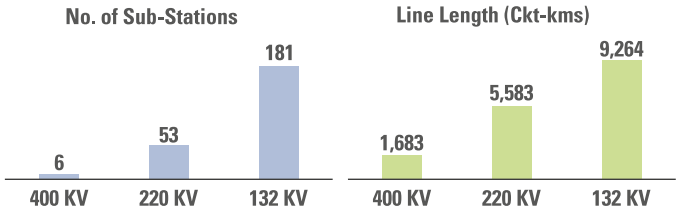


Table 31: Transmission Loss Trajectory

Parameter	2010-11	2011-12	2012-13	2013-14	2014-15
Transmission Loss %	4.50%	4.22%	3.97%	3.59%	3.18%

5.2 Interstate Transmission System

Presently CTU is operating four viz., Ghanapur (Hyderabad), Oglapur (Warangal), Nagarjuna Sagar & Boodidampadu (Khammam) 400/220 kV Substations in Telangana with 3150 MVA transformer capacity. Ghanapur, Warangal and Khammam Substations are being augmented with 500 MVA Transformer each. The corresponding EHV line length owned by CTU is 3660 Ckm with following major lines:

- Ramagundam – Chandrapur 400 kV D/C
- Nagarjuna Sagar - Hyderabad 400 kV S/C
- Nagarjuna Sagar - Cuddapah 400 kV D/C
- Nagarjuna Sagar – Mahboobnagar 400 kV S/C
- Nagarjuna Sagar – Khammam – 400kV S/C
- Nagarjuna Sagar - Kurnool 400 kV S/C
- Khammam – Vizag 400 kV D/C
- Khammam – Vijayawada 400 kV S/C
- Hyderabad – Kurnool 400 kV S/C
- Mahboobnagar – Raichur 400 kV S/C

To facilitate drawl of power by Telangana and to meet projected peak load of 19,053 MW by 2018-19 a robust Inter-state transmission system (ISTS) has been planned and is under construction. Further for evacuation of power from state generating stations as well as for transfer to various load centres within Telangana, a vast Intra State Transmission Network has been developed and planned.

To meet the growing power demand of the state following projects are under execution by CTU:

- 2x1500MVA, 765/400 kV Substation at Hyderabad (Maheshwaram)
- 2x1500MVA, 765/400 kV Substation at Nizamabad
- Hyderabad (Maheshwaram) – Nizamabad 765 kV D/C Line
- Wardha – Nizamabad 765 kV D/C Line
- Nizamabad (Power Grid) – Dichpally (TSTRANSCO) 400kV D/C Line
- LILO of Hyderabad – Kurnool 400 kV S/C line at Hyderabad (Maheshwaram) Substation
- Khammam – Nagarjuna Sagar 400 kV D/C line- (under TBCB Route)

TBCB lines-Bidding process in progress

- Nizamabad (Power Grid) to Shankarapally (TSTRANSCO) 400 kV D/C
- Maheshwaram (Hyderabad) – Mehaboobnagar 400 kV D/C line.

5.2.1 ISTS Projects under construction

a. **Wardha-Nizamabad-Hyderabad 765kV D/C line – 1,072 Ckm:**
Construction of 1072 circuit km of 765 kV line is under implementation by CTU. Wardha–Nizamabad–Hyderabad 765 kV lines would facilitate import from the pit head Coal based generating stations located in Western region. Telangana has initially entered MOU with Chhattisgarh State for import of 1000 MW and for further import of 1000 MW is in pipeline.

b. **Warora-Warangal–Hyderabad 765 kV D/C line – Proposal:**
In order to import power NEW grid, CTU has planned another 765 kV D/C line from Warora-Warangal–Hyderabad which is being implemented through TBCB route. Aforesaid transmission lines would facilitate power transferring capability of about 2000-3000MW to the Southern Region.

c. **ISTS Wind Evacuation Project:**
Erection of 400kV QMDC Line from existing 400kV Veltoor Sub-Station (existing) to Tungabhadra river crossing point (TS TRANSCO scope of work) is under progress.

d. System Strengthening:
To meet the growing power demand of Telangana – various augmentation and system strengthening activities are proposed to be carried out progressively. Augmentation of transformer capacity by 1155 MVA at 400 kV and 220 kV voltage level i.e., at 400/220 kV Mamidipalli SS, 220/132 kV Moulali, 220/132 kV Shapurnagar 220/132 kV Bhongiri, 220/132 kV Gajwel, 220/132 kV Narketpalli and 220/132 kV Bellampalli are proposed to be taken up.

400 kV ring mains for reliable power supply are under implementation: Erection of balance 79 km portion of 400kV LILO from Circuit-I of Srisailam-Mamidiaplly DC line to 400/220kV Shankarapally Sub-Station is under implementation.

5.2.2 Action Points – CTU

- POWERGRID/Implementing agency to ensure development of interstate transmission as indicated above progressively by 2018-19
- For the above proposed measures for Renewable Energy generation integration, as of now, no Connectivity/LTA applications has been received by PGCIL from the state.

5.2.2.1 Key risks

- Right of Way Issues: RoW clearances should be taken up expeditiously so as to avoid any hindrances in the infrastructure additions planned by TSTRANSCO thereby meeting the interstate evacuation schemes as planned
- Delay in commissioning: Any delay in the upcoming interstate evacuation schemes can seriously alter the power supply scenario and its completion needs to be taken up expeditiously.

Table 32: Status of Strengthening of Intra State Transmission System at ISTS Interconnection Points at Hyderabad and Nizamabad

Scheme Details	Capacity/ Line Length	Contracted Capacity with TSDISCOMS (MW)
Establishment of Maheshwaram (TS) 400/220 kV SS	2 x 500 MVA	• Land Acquisition is in progress • Tenders to be invited shortly
Maheshwaram (PG) – Maheshwaram (TS) by short 400 kV D/C Line	5 KM	
Maheshwaram (TS) – Yeddumailaram (Shankarpalli) 400 kV D/C Line (to be established by realignment of LILO of Srisailam – Mamidipalli at Shankarpalli and re-instating the Srisailam – Mamidipalli 400 kV D/C Line	15 KM	
LILO of Nizamabad – Yeddmailaram (Shankarpalli) 400 kV D/C line at Narsapur	50 KM	Survey (PGCIL) 765/400 kV Nizamabad SS to Shankarpalli is to be taken up following which the survey of LILO lines will be taken

5.3 Intra State Transmission System

At present Telangana State has 240 EHT substations having transformation capacity of 32,596 MVA with associated EHT Line length of 16,595 Ckm.

The Details are as mentioned in the table below:

Table 33: Current Transmission Infrastructure in Telangana State

Voltage Level	Substations (No.)	Lines (Ckm)	Transformation Capacity (MVA)
400 kV	6	1,683	5,355
220 kV	53	5,581	12,815
132kV	181	9,331	14,426
Total	**240**	**16,595**	**32,596**

5.3.1 Existing System

The transmission network that presently caters to the load across the State as on 31- May-2015 is as follows:

- 6 Nos of 400 kV grid substations with 5,355 MVA capacity and 1,683ckt Km of associated lines.
- 53 Nos of 220 kV grid substations with 12,815 MVA capacity and 5,581 CKt Km. of associated lines.
- 181 Nos of 132 kV grid substations with 14,426 MVA capacity and 9,331 Ckt Km. of associated lines

To meet a projected load demand of 19,053 MW by FY 2018-19, a robust intrastate transmission system has been planned and the same is under various stages of implementation.

5.3.2 Under Construction/Planned Intra State Transmission system

- 17 Nos. of 400 kV grid substations and 4,308 Ckt Km of associated lines are planned/ under construction
- 35 Nos of 220kV substation and 1,990 Ckt Km of associated lines are planned/under construction
- 92 Nos of 132kV substation and 2,508 Ckt Km of associated lines are planned/under construction.

The details of proposed physical plan are mentioned in the table below:

Table 34: Proposed physical plan for Intra State Transmission System for 2014-15 to 2018-19

Voltage Level	Unit	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
400KV	No		3	6	4	4	**17**
	MVA		2,605	5,835	3,660	2,920	**15,020**
	Ckm.		337	853	2,600	518	**4,308**
220KV	No	3	11	11	7	3	**35**
	MVA	490	2,646	2,386	1,400	600	**7,522**
	Ckm.	22	629	979	280	80	**1,990**
132KV	No	8	31	24	13	16	**92**
	MVA	278	2,409	1,407	819	1,008	**5,921**
	Ckm.	127	931	915	309	226	**2,508**

Following evacuation schemes have been planned for evacuation of power from the upcoming plants:

Jaipur power evacuation scheme:

Laying of 325 ckt-kms of 400kV quad DC line from Jaipur TPP to Rangampet and from Rangampet to Gajwel at an estimated cost of Rs.387 crs. This scheme is under progress.

Proposed power evacuation scheme for 4x270MW at Manuguru and 1 x 800MW KTPS (Stage – VII)

- Construction of 400/ 220 kV SS Jangoan with 3 X 500MVA and 400/220 kV SS at Julurpadu with 2X315 MVA transformers at an estimated cost of Rs.269 crs
- Laying of 1230 ckt-kms of 400 kV quad DC line at an estimated cost of Rs.1556 crs.

Proposed power evacuation scheme of generating stations at Damaracherla Mandal, Nalgonda district

- Construction of 2x315 MVA SS Dindi and 3x500 MVA SS at Chotuppal, at an estimated cost of Rs.269 Crs
- Laying of 1200 ckt-kms of 400kV quad DC line at an estimated cost of Rs.1518 crs

Bulk load schemes have been planned for major Lift Irrigation schemes

- Indira Sagar Rudrama Kota LIS in Khammam district at an estimated cost of Rs.137 crs
- Pranahita Chevalla LIS in Karimnagar district at an estimated cost of Rs.2632.18 crs.

5.4 Transmission System for Integration of large Renewable Projects

Telangana State is promoting renewable capacity addition in a big way. Solar capacity is being taken up by way of competitive bidding. For Wind, capacity additions are allowed as and when developers are coming forward to put up a plant in the State and they are being provided grid connectivity by conducting feasibility studies. The transmission system has been planned for additional capacity of 3,000 MW out of the proposed additional 6,016 MW renewable capacity by 2018-19, which is mainly through solar generation. The additional evacuation system for proposed solar capacity addition will be planned and implemented in due course, in consultation with State Govt.

It is also proposed to promote solar capacity addition though the concept of Solar Parks/Solar Zones and the details of proposed evacuation schemes for the Solar Parks/Solar Zones is tabulated below

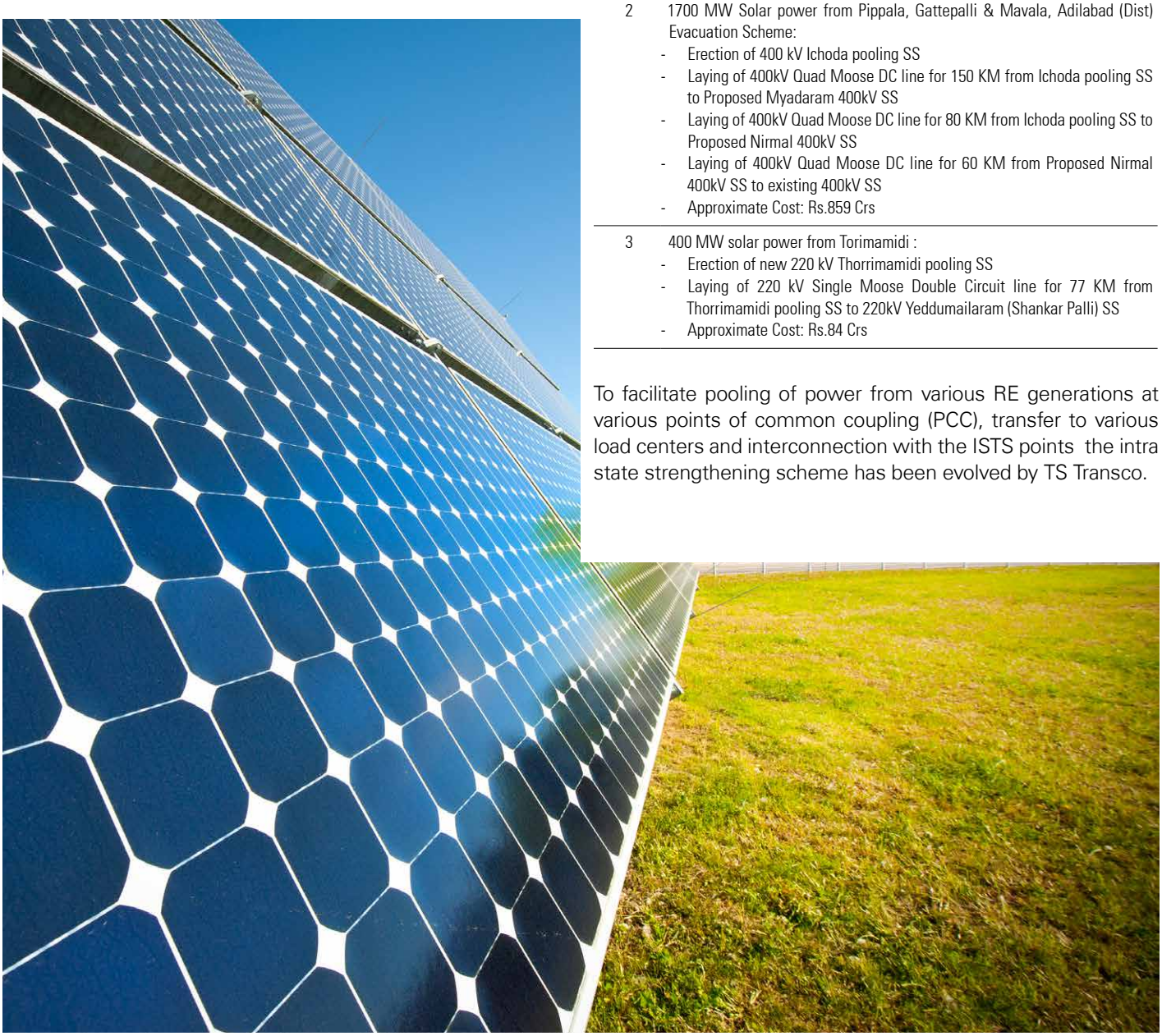
Table 35: Details of renewable capacity for which transmission system has planned by 2018-19

	Wind	Solar
Transmission system planned for capacity Addition by (2018-19)		2,600

Table 36: Intra State Transmission Evacuation Scheme of Upcoming Renewables Sources

Sr. No.	Name of Transmission line (kV)/Substation
1	1000 MW Solar power from Gattu, Mahabubnagar (Dist) Evacuation Scheme: - Erection of 400kV pooling sub-station at Gattu - Laying of 400kV Quad Moose Double Circuit line for 70 KM from Gattu pooling station to existing 400/220kV Veltoor SS - Approximate Cost: Rs.275 Crs
2	1700 MW Solar power from Pippala, Gattepalli & Mavala, Adilabad (Dist) Evacuation Scheme: - Erection of 400 kV Ichoda pooling SS - Laying of 400kV Quad Moose DC line for 150 KM from Ichoda pooling SS to Proposed Myadaram 400kV SS - Laying of 400kV Quad Moose DC line for 80 KM from Ichoda pooling SS to Proposed Nirmal 400kV SS - Laying of 400kV Quad Moose DC line for 60 KM from Proposed Nirmal 400kV SS to existing 400kV SS - Approximate Cost: Rs.859 Crs
3	400 MW solar power from Torimamidi : - Erection of new 220 kV Thorrimamidi pooling SS - Laying of 220 kV Single Moose Double Circuit line for 77 KM from Thorrimamidi pooling SS to 220kV Yeddumailaram (Shankar Palli) SS - Approximate Cost: Rs.84 Crs

To facilitate pooling of power from various RE generations at various points of common coupling (PCC), transfer to various load centers and interconnection with the ISTS points the intra state strengthening scheme has been evolved by TS Transco.



5.5 Investments for Intra State Transmission Network

Total investment of Rs 17,803 Crs: Rs 17,803 Crs for intra state system (incl. cost of Augmentations, SCADA, IT items, establishment of metering , communication & data control centres, ERP, RMU, PLCC equipment etc.)

The funding for the above investment will be arranged by borrowing from financial institutions with required equity support from Government of Telangana. Funding of Rs 4,608 has been tied up so far. The recovery of the above investment will be done through wheeling charges which will be factored in the tariff.

Details of above investment for intrastate transmission network are given at Annexure.

Table 37: Summary of investments in transmission sector

(All Values are in Rs Crs)	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
Total Investment (excluding Solar Parks)	**1,345**	**6,345**	**4,549**	**3,801**	**1,764**	**17,803**
Funds tied up - 132KV, 220 KV	940	2,025	262			3,226
Funds tied up - 400KV	405	977				1,382
Funds tied-up (Total)	**1,345**	**3,001**	**262**	**0**	**0**	**4,608**
Funds yet to be tied up - 132KV, 220 KV		776	1,032	1,353	692	3,853
Funds yet to be tied up - 400KV		2,568	3,255	2,447	1,071	9,341
Solar Parks Evacuation Plan				825	355	1,180
Total Investment	**1,345**	**6,345**	**4,549**	**4,626**	**2,118**	**18,983**
Funds yet to be tied-up	**0**	**3,344**	**4,287**	**4,626**	**2,118**	**14,375**

5.5.1 Adequacy of State Transmission System

5.5.1.1 Intra State Transmission Adequacy

By the end of FY 2018-19, the above proposed transmission system will be capable of meeting projected peak load of more than 21,000 MW and RE power of about 6,016 MW which is mainly through solar generation. The additional transmission system (if required) for evacuation of anticipated RE power more than planned capacity shall also be identified, approved and implemented as per system requirement matching with the RE generation.

Details of the voltage wise adequacy of the network has been shown below:

Table 38: Transmission System Adequacy (end of FY 2018-19)

Parameter	132KV	220 KV	400KV
Existing (MVA)	14,426	12,815	5,355
Additional (MVA)	5,921	7,522	15,020
Total	20,347	20,337	20,375
Projected Peak Demand (MVA)	19,281	18,575	17,254
% Adequacy	**106%**	**109%**	**118%**

From the above table it shows that the system at 132,220 and 400 kV voltage level is capable of handling loads in the order of 20,000MVA and thereby the system is adequate.

Details of the Substations, transformation capacity and the line length have been shared in the annexures.

5.5.1.2 Inter State Transmission Adequacy

Regarding adequacy of inter-state transmission system for meeting power for all programme in the state of Telangana, respective Central Transmission Utility (CTU) would furnish supporting studies and details to CEA within three months.

5.5.2 Action points – TS Transco

- The proposed transmission system up to 2018-19 needs to be implemented as per schedule for ensuring 24x7 power supply in the State.
- The funding for implementation of Intra State transmission system amounting to Rs. 17,803 Crores and Rs 1,218 for Solar Generation Evacuation Schemes shall be timely arranged/tied up through FIs and internal accruals.
- Regarding adequacy of transmission system for meeting power for all programme in the state of Telangana, TS Transco (i.e. STU) would furnish supporting studies and details to CEA within three months.

5.6 Transmission Roll Out Strategy

5.6.1 KTPS VII Program Schedule

Erection of 400kV Quad Moose DC line from KTPS 1 X 800 MW to Julurupadu - 35 kms, Julurupadu to Suryapet - 125 kms and Julurupadu - Jangaon - 200kms

Table 39: Program Schedule for KTPS Evacuation Scheme

Sr. No.	Parameter	Oct'15-Dec'15	Jan'16-Mar'16	Apr'16-Jun'16	Jul'16-Sept'16	Oct'16-Dec'16	Jan'17-Mar'17
1	Date of handing over of profiles	25%	75%				
2	Detailed / Check Survey	25%	50%	25%			
3	Classification, Excavation, Stub Setting & Concreting		20%	30%	30%	20%	
4	Supply of Tower parts		20%	30%	30%	20%	
5	Supply of sub-vendor items		20%	30%	30%	20%	
6	Tower Erection			20%	30%	30%	20%
7	Stringing of Conductor and Earth wire & OPGW			10%	30%	30%	30%
8	Testing and Commissioning						100%

5.6.2 BTPS Schedule Program

Erection of 400kV Quad Moose DC line from Bhadradri Thermal Power Station (4 x 270MW) Manuguru to 400kV Jururpadu SS - 110kM and Julurupadu to Khammam -50KM

Table 40: Program Schedule for BTPS Evacuation Scheme

Sr. No.	Parameter	Oct'15-Dec'15	Jan'16-Mar'16	Apr'16-Jun'16	Jul'16-Sept'16	Oct'16-Dec'16
1	Date of handing over of profiles	100%				
2	Detailed / Check Survey	75%	25%			
3	Classification, Excavation, Stub Setting & Concreting	10%	30%	30%	30%	
4	Supply of Tower parts	10%	30%	30%	30%	
5	Supply of sub-vendor items		35%	35%	30%	
6	Tower Erection		10%	35%	35%	20%
7	Stringing of Conductor and Earthwire & OPGW			30%	30%	40%
8	Testing and Commissioning					100%

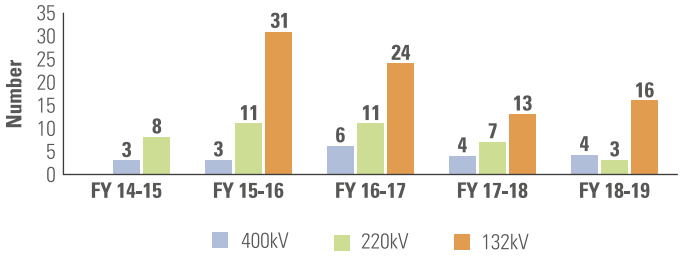
5.6.3 Year Wise Roll of Sub Station Additions of TS TRANSCO

Erection of 400kV Quad Moose DC line from Bhadradri Thermal Power Station (4 x 270MW) Manuguru to 400kV Jururpadu SS - 110kM and Julurupadu to Khammam -50KM

Table 41: Cumulative addition of transmission lines

Type	SS (Nos)	MVA
400kV	17	15,020
220kV	35	7,522
132kV	92	5,921
Total	**144**	**28,463**

Figure 17: Year wise addition of sub stations – Under construction and planned

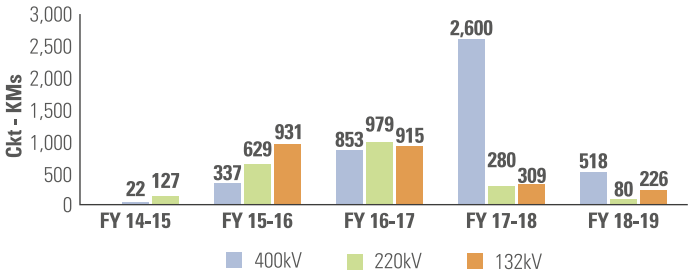


5.6.4 Year Wise addition of Transmission Lines Planned by TSTRANSCO

Table 42: Cumulative addition of transmission lines

Type	Ckt - Kms
400kV	4,308
220kV	1,990
132kV	2,508
Total	**8,806**

Figure 18: Year Wise Addition of Transmission Lines



5.6.5 GoI Intervention

The summary of GOI interventions is as below:

- Expediting the completion of inter-state transmission lines to enable power evacuation from NEW region to SR region. Resolution of Right of way and forest clearance issues
- Grant of fund for creation of adequate transmission infrastructure in the State (under National Electricity Fund)
- The funds required for transmission network to evacuate power form solar parks is Rs 932 Crs. This work may be taken up under Green Energy Corridor Scheme.

5.6.6 Proposed Intrastate Schemes under Green Energy Corridor

- Augmentation of 220/132 KV Power transformers to the tune of 2760MVA in 26 Nos existing substations and augmentation of 132/33KV to the tune of 4922 MVA in 141 Nos. existing substations at a cost of Rs.628.91 Crores
- Enhancement of line capacities with ACCC conductor (High Temperature Low Sag – HTLS Conductor) of 6 Nos. 220 KV feeders of 74.9 Km and 15 Nos. 132 KV feeders of 478.02 Km is being planned at a total cost of Rs 303.36 Crores.

06. **Distribution Plan**

6 Distribution Plan

Distribution network of the state of Telangana is governed by two DISCOMs namely, the Telangana State Northern Power Distribution Company Limited (TSNPDCL) and Telangana State Southern Power Distribution Company Limited (TSSPDCL)

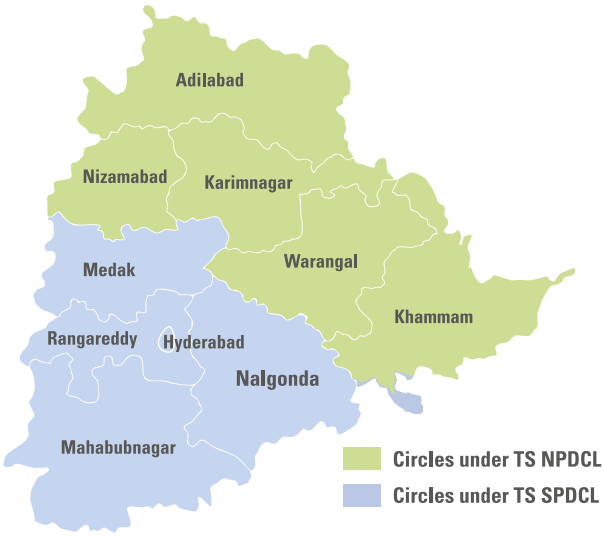
TSNPDCL caters to the northern districts of the state including Warangal, Karimnagar, Khammam, Nizamabad and Adilabad while TSSPDCL caters to the southern part including Hyderabad, Ranga Reddy, Medak, Nalgonda and Mahabubnagar.

Presently, the distribution infrastructure in the state consists of 300,765 Km of LT lines, 132,589 Km of 11 kV lines and 18,895 Km of 33 kV lines. Number of distribution transformers (DTRs) in the state is 519,538, number of power transformers in the state is 3,328 and number of 33/11 kV Substations is 2,240. Percentage of metering including agricultural consumers is 87% for TSSPDCL and 79% for TSNPDCL. Feeder metering is 100% in the state, while DTR metering is 22% for TSSPDCL and 5.8% for TSNPDCL.

The state has a commendable track record of distribution sector performance with AT & C losses at 12.61% in FY 2014-15. DTR failure rate was 11.18% for TSSPDCL and 12.44% for TSNPDCL for FY 13-14. Metrics for measuring feeder interruptions i.e. SAIDI was 752 minutes for TSSPDCL and 847 minutes for TSNPDCL in the year FY 2013-14.

The state endeavors to provide 24x7 power supply to all categories of consumers. However, given the infrastructural limitations, power supply for agricultural consumers has been limited to 7 hours in the day while power supply to rural consumers has been limited to 15 hours in the day. The state has plans to improve the power supply to rural consumers to 24 hours in a day by FY 2017-18 and improve the power supply to agricultural consumers to 9 hours in the day by FY 2016-17.

The state has serious plans to ensure 24x7 power to all categories of consumers and 9 hours of supply to agriculture consumers and has planned significant investments towards achievement of this objective. The state has also plans to bring in operational efficiency by adopting international best practices and successful technologies whilst also improving consumer convenience. These measures are explained in the following section.



6.1 Schemes under implementation

6.1.1 R-APDRP

Government of India has launched the Restructured-Accelerated Power Development and Reforms program (R-APDRP) as a central sector scheme to encourage energy audit and accounting through IT interventions and to reduce AT&C losses. Scheme comprises of projects categorized into Part A and Part B. Part A projects are IT implementation projects which include applications for energy accounting, auditing, GIS, consumer indexing, SCADA & IT based consumer service centres. Part B includes regular distribution strengthening works which include but not limited to erection of 33/11 kV SS, bifurcation of 33 kVA and 11 kVA overload feeders, reinforcement of feeders, reinforcement of 33 kV and 11 kV lines, replacement of over lines to 11 kV AB Cables, erection of 100kVA additional DTRs, reconductoring of LT Lines, conversion of Single Ph to Three Ph, replacement of non hi quality to high quality meters, shifting of meters inside the premises of the consumer to outside meters.

As on August 2015, under Part A, TSSPDCL have incurred an expenditure of INR 148.52 Crs for the total scheme cost of INR 156.04 Crs and TSNPDCL have incurred an expenditure of INR 24.23 Crs of the total scheme cost of INR 44.50 Crs. Under Part A - SCADA/DMS, INR 19.54 CRs have been released by PFC in which only INR 3.43 Crs were spent by TSSPDCL on an estimated total scheme cost of INR 90.48 Crs while TSNPDCL incurred a total expenditure of INR 1.1 Crs on an estimated total scheme cost of INR 12.47 Crs in which only INR 3.74 Crs were released by PFC

Under Part B, for TSSPDCL out of 15 towns programmed 3 have been completed and works for 12 are under progress. Of the total scheme cost of INR 970.03 Crs INR 756.9 Crs have been spent in which INR 145.5 Crs have been release by PFC and INR 272.98 Crs have been release by REC. On the other hand TSNPDCL incurred a total expenditure of INR 135.2 Crs on an estimated total scheme cost of INR 179.14 Crs in which only INR 147.57 Crs were released by PFC.

6.1.2 RGGVY

RGGVY is a scheme notified by the Central Government for electrification of un-electrified households. Under this scheme, electricity connections are being provided for rural households in the habitations with population of more than 100 only. The status of these schemes is presented below:

6.1.2.1 RGGVY 10th and 11th plan

The scheme was approved for an overall project cost of Rs 309.89 Crores in which INR 288.34 Crs including INR 259.09 Crs of subsidy have been released. As on date total connections under this scheme are 708,865 in which all work is completed and there is no pending release of any connections.

6.2 Proposed schemes

To achieve the objective of ensuring 24x7 power to all consumers and proposed increase in number of hours of supply to agricultural consumers, the state has planned significant investments under various schemes. Investments are planned across various aspects of distribution infrastructure improvement including (a) load growth and network strengthening (b) technology upgradation, renovation and modernization schemes (c) measures for bringing down AT&C losses, and (d) Demand Side Management (DSM) measures and (e) Other expenditure towards general network improvement

Investments can be broadly categorized as follows:

1. Regular distribution infrastructure works i.e. Business-As-Usual investments
2. Dedicated investments for ensuring 24x7 power supply to rural consumers under the Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) scheme
3. Dedicated investments for ensuring 24x7 power supply to urban consumers under the Integrated Power Development Scheme (IPDS)

6.2.1 Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)

Government of India launched "Deendayal Upadhyaya Gram Jyoti Yojna" (DDUGJY) on 3rd December, 2014 for

1. Separation of agriculture and non-agriculture feeders facilitating judicious restoring of supply to agricultural & non-agriculture consumers in the rural areas; and
2. Strengthening and augmentation of sub-transmission & distribution infrastructure in rural areas, including metering of distribution transformers /feeders/consumers.
3. Rural electrification for completion of the targets laid down under RGGVY for 12th and 13th Plans by carrying forward the approved outlay for RGGVY to DDUGJY.

6.2.1.1 Connecting the Un-connected

Present scenario

As on date, there are no un-electrified urban households in TSSPDCL while there are 44,532 urban households to be electrified in TSNPDCL. In rural areas as on date, 401,568 number of rural household remain to be electrified in TSSPDCL, while the number of rural households yet to be electrified in TSNPDCL is 320,020.

A total of 120,323 BPL households in TSNPDCL and 293,668 households in TSSPDCL were electrified under RGGVY 10th and 11th plan between 2010 and 2014.

Table below summarizes the status of electrification across the both the DISCOMs and the state.

Table 43: Electrification status of the DISCOMs as on end of FY 2014-15

Parameters	TSSPDCL (Nos.)	TSNPDCL (Nos.)	Total (Nos.)
Total number of households	5,133,440	3,340,477	8,473,917
Number of rural Households	1,846,846	2,262,222	4,109,068
Number of electrified rural households	1,445,278	1,942,202	3,387,480
Number of un-electrified rural households	401,568	320,020	721,588
Number of urban households	3,286,594	1,078,255	4,364,849
Number of electrified urban households	3,286,594	1,033,723	4,320,317
Number of un-electrified urban households	0	44,532	44,532

6.2.1.2 Proposed electrification plan

The state is committed towards ensuring 100% electrification of all households by the FY 2017-18. Electrification plan of the state is as hereunder:

1. 44,532 number of urban un-electrified households in TSNPDCL will be electrified as a part of the state's plan
2. DPR has been submitted for electrification of 320,020 rural households for TSNPDCL and 401,568 rural households for TSSPDCL over the next five years under DDUGJY
3. All newly constructed urban and rural households will be electrified in the financial year of establishment

Table 44: The table below summarizes the proposed electrification plan of the state

Parameter	FY 15-16	FY 16-17	FY 17-18	FY 18-19
TSNPDCL				
Connecting existing un-electrified rural households (%age)	20%	40%	40%	100%
Connecting existing un-electrified urban households (%age)	34%	34%	33%	100%
Connecting existing un-electrified rural households (Nos)	64,004	128,008	128,008	320,020
Connecting existing un-electrified urban households (Nos)	15,000	15,000	14,532	44,532
TSSPDCL				
Connecting existing un-electrified rural households (%age)	20%	40%	40%	100%
Connecting existing un-electrified rural households (Nos)	80,314	160,627	160,627	401,568
Total number of households electrified in the state	**159,318**	**303,635**	**303,167**	**766,120**

Table 45: Year wise CAPEX planned for electrification of households

Parameters (INR Crs)	FY 15-16	FY 16-17	FY 17-18	Total
TSSPDCL	49	98	98	245
TSNPDCL	98	192	192	483
TSDISCOMs	**147**	**290**	**290**	**728**

6.2.1.3 Rural Households Proposed to be electrified through Decentralized Distributed Generation (DDG)

DDG i.e. Decentralized Distributed Generation is an electrification scheme for remote habitats in the midst of dense forest where electrification though conventional methods of grid connectivity is either not feasible or cost effective.

In Mahabubnagar District, 22 locations have been identified in this scheme with a project cost of around INR 5 crores. Their electrification is being carried out as per DDUGJY the erstwhile RGGVY 12th plan. The electrification will serve 365 Below Poverty Line Households in this area and the average cost of electrification per household comes up to INR 1.82 Lakhs.

Table 46: Year wise CAPEX planned under DDG Scheme

Parameters (INR Crs)	FY 15-16	FY 16-17	FY 17-18	Total
DDG Scheme	1	2	2	5

6.2.2 Other initiatives under DDUGJY

Other network additions under DDUGJY include segregation of feeders (33 and 11kV feeders), strengthening of sub transmission and distribution network, metering works etc.

The table below shows the investments planned under DDUGJY.

Detailed network addition works under each DISCOMs have been provided in annexures.

Table 47: Investments planned under DDUGJY for TSDISCOMs

Parameters	FY 2015-16 (Rs Crs)	FY 2016-17 (Rs Crs)	FY 2017-18 (Rs Crs)	FY 2018-19 (Rs Crs)	Total (Rs Crs)
Load growth and network strengthening	893	893	632	632	3,051
Technology upgradation, renovation and modernization schemes	1	1	-	-	2
Measures for bringing down AT&C losses	801	801	563	563	2,726
DSM measures	9	9	5	5	28
Renewable Energy Measures	225	225	225	61	737
Total	**1,930**	**1,930**	**1,425**	**1,261**	**6,545**

6.3 Integrated Power Development Scheme (IPDS)

The Central Government has sanctioned "Integrated Power Development Scheme" (IPDS) on 3rd December, 2014 for urban area for:

1. Strengthening of sub-transmission and distribution networks in the urban areas.
2. Metering of distribution transformer/feeders/consumers in the urban areas.
3. IT enablement of distribution sector and strengthening of distribution network, for completion of the targets laid down under R-APDRP for 12th and 13th Plans by carrying forward the approved outlay for R-APDRP to IPDS.

In order to achieve the 24x7 Power For All milestones, TSDISCOMs have planned significant works under various heads like Load Growth and Network Strengthening, Reduction of AT&C Loss and DSM Measures.

The table below shows the investments planned under IPDS.

Detailed network addition works under each DISCOMs have been provided in annexures.

Table 48: Investments planned under IPDS for TSDISCOMs

Parameters	FY 2015-16 (Rs Crs)	FY 2016-17 (Rs Crs)	FY 2017-18 (Rs Crs)	FY 2018-19 (Rs Crs)	Total (Rs Crs)
Load growth and network strengthening	577	577	510	510	2,175
Technology upgradation, renovation and modernization schemes	53	53	-	-	105
Measures for bringing down AT&C losses	306	306	232	232	1,076
DSM measures	13	13	6	6	39
Renewable Energy Measures	11	11	5	5	32
Total	**960**	**960**	**754**	**754**	**3,428**

6.4 Summary of network additions in distribution sector for TSDISCOMs

6.4.1 Load growth and network strengthening

Key activities for load growth and network strengthening include:

1. Addition of 937 new 33/11 kV substations
2. Addition of Power Transformers (PTRs) of 1,147 in number
3. Augmentation of capacity for 948 PTRs
4. Laying of new feeders of length 56,294 Km
5. Augmentation of existing feeders of length 98,825 Km
6. Additions of Distribution Transformers (DTRs) of number 3,40,551
7. Augmentation of 6,590 numbers of existing DTRs
8. R&M works for substations, LT DTRs and other DTRs.

Summary of infrastructure additions planned is presented in the table below:

Table 49: Summary of infrastructure planned in the state

Category	Units	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
SS unit additions	Nos	73	254	231	175	202	937
PTR additions	Nos	38	626	518	457	456	2095
Feeder Additions	Km	10,934	38,866	40,630	33,916	30,773	155,119
DTR additions	Nos	41,846	81,343	79,343	73,471	71,138	347,141

6.4.2 Technology upgradation, renovation and modernization

Key activities under this category include:

1. Automation of substations
2. GIS mapping of services
3. Implementation of WAN across key locations
4. Automatic Meter Reading (AMR) solutions for meters
5. SCADA implementation across selected towns
6. Additional ERP/IT applications

All the above investments are planned by the DISCOMS through internal funds and support (if required) from State Government. Accordingly, these are included in the Multi-Year Tariff filings of the DISCOMS. The latest filing for MYT investments was undertaken in FY 2014-15.

Table 50: Summary of investments planned towards technology upgradation, renovation and modernization is presented in table below:

Total Capex for technology upgradation, renovation and modernization schemes		Unit	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
		Rs Cr	41	114	110	58	33	357
Business As Usual investments								
a)	Automation of Substations	Nos.	100	214	214	214	100	842
		Crs.	1	27	27	27	1	83
b)	GIS mapping (services)	Nos.	250,000	250,000	250,000	250,000	250,000	1,250,000
		Crs.	9	3	3	3	3	20
c)	WAN (Locations)	Nos.	200	200	0	0	0	400
		Crs.	6	7	1	1	0	15
d)	AMR solutions (Meters)	Nos.	32,000	32,200	32,400	32,600	32,800	162,000
		Crs.	17	18	19	20	21	95
e)	SCADA (Towns)	Nos.	1	1	1	1	1	5
		Crs.	4	4	4	5	5	22
f)	ERP/IT applications	Crs.	3	3	3	3	3	15

6.4.3 Measures for bringing down AT&C losses

Key projects under this investment category include:

1. Replacement of meters of nearly 170,000in numbers with high quality meters
2. Installation of meters for 924 feeders
3. Installation of meters for 26,085 distribution transformers (DTRs)
4. Installation of meters for over 14,89,023 consumer connections
5. Implementation of High Voltage Distribution System across 577,986 units
6. Laying of AB cables of length 7,554 Km
7. Installation of MRI instruments of 1,385 Nos
8. Replacement of existing 34 sqmm conductor with 54 sqmm conductor for over 4,730 Km
9. Augmentation of 2,237 Km of 11 kV feeders
10. Augmentation of LT lines of 4,993 Km in length.

6.4.4 Loss Reduction Trajectory

Table 51: AT&C Loss Reduction Trajectory of TSDISCOMs

AT&C Loss Trajectory (%)	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
SPDCL	12.51%	11.83%	11.65%	10.87%	10.48%
NPDCL	13.32%	12.88%	12.58%	12.28%	12.00%

6.4.5 Demand Side Management (DSM) Measures

Demand-side Management measures proposed at the consumer-end are discussed in the Energy Efficiency Section of this report. The current section details our DSM measures proposed by the DISCOMS for improving distribution network performance

An estimated amount of Rs 191 Crores is planned over the next five years for installation of capacitor banks.

6.4.6 Other expenditure

A total of Rs 1,652 Crores is planned as expenditure towards general infrastructure improvements including the following:

1. Reliability improvement and contingency schemes
2. Renovation & Modernization schemes
3. Civil infrastructure development
4. Cost of land acquisition for new substations
5. Road cutting cost for cables

All the above activities will be undertaken as per the State's plan.

6.4.7 Performance monitoring mechanism

In order to implement appropriate reform measures and meet the objective of maximizing distribution infrastructure performance, baseline parameters need to be verified and established. It is proposed that an independent agency be engaged for third party audit for establishing baseline parameters for the following Key Performance Indicators (KPIs), following which these KPIs need to monitored at the highest level.

Table 52: KPIs to be monitored as a corporate strategic objective

Corporate strategic objective	KPI	UOM
Sustain and achieve AT&C loss reduction	AT&C losses	%age
	Collection Efficiency	%age
	Billing Efficiency	%age
Monitoring Distribution Cost	Establishment Cost	Rs Crs
	R&M cost	Rs Crs
	A&G Cost	Rs Crs
	Power Purchase Cost	Rs Crs
Enhancing customer satisfaction	CSI Overall	Index
	Total consumer complaints	Nos
	New initiatives to enhance consumer convenience	Nos
Operational efficiency	Number of customers served per employee	Nos
System Reliability	SAIDI	Hrs
	SAIFI	Nos
	DTR failure rate	%age
	PADCI	Months
	No. of Accidents (fatal/non-fatal)	Nos

6.4.8 Smart Grid Initiatives of TSSDPCL

6.4.8.1 Scope of Pilot Project

The pilot project is a TSSPDCL initiative in pursuance of its Mission to ensure complete Customer Satisfaction by providing its customers quality, reliable power at competitive rates. The smart grid philosophy supports the above objective through choice of functionalities. Each of the functionality contributes its share of benefit.

TSSPDCL was accorded approval by MoP to take up its proposal to carry out the Jeedimetla Industrial Area Smart Grid Pilot Project. This smart grid pilot project is for studying the philosophy of futuristic smart grid concept for managing the power distribution with the aid of intelligent technology. It envisages deployment of about 12,000 smart meters among 43,000 consumers, automation of HT and LT network as required, strengthening the distribution network and introducing the IT and Communication technologies. The project site has mix of all categories of consumers with industrial consumers contributing to higher power consumption.

Through this pilot project TSSPDCL aim to seek a modernized distribution infrastructure through which policies and framework for an integrated distribution management can be rolled out and fine-tuned.

6.4.8.2 Scope of Work

1. The end to end smart grid system constitute
   a. AMI – Automatic Metering Infrastructure for Industrial and Residential consumers
   b. OMS – Outage Management System
   c. PMS – Peak Management System
   d. PQM – Power Quality management System
   e. SGCC – Smart Grid Control Centre – To bring up SGCC with complete suite of hardware and software for overall control and management of Jeedimetla pilot area.

6.4.8.3 Project Area Particulars

The project site is part of an Industrial hub and has good infrastructure and accessible roads and is one of the prominent localities of Hyderabad abutting a national highway. The locality is dominated by Steel, Chemical, Pharmaceuticals, Plastics and Engineering Industries besides commercial and residential consumers.

Table 53: Project Area particulars of Jeedimetla Industrial Area in RR Reddy District are mentioned in the table below:

Particulars	Units	Value
No of Sub Stations	Nos	5
No of feeders including idle feeders	Nos	43
Total station capacity	MVA	125.5
No of DTRs	Nos	1216
Total Capacity of DTRs	MVA	117.78
Input Energy	MU	420
Connected Load	MW	101.72
Energy Consumption	MU	392.16
Line Length – HT	Km	158.9
Line Length – LT	Km	250
Revenue	INR Crs Per Month	28.44

Table 54: Details of consumer base in the area

Consumer Break Up	Total
Domestic	35,668
Commercial	5,512
Industrial	2,028
Public Water Works	109
Street Lighting	237
HT Industrial	345
Others	54
Total	**43,953**

6.4.8.4 Salient Features of Smart Grid Pilot Project in Jeedimetla Industrial Area, Ranga Reddy District

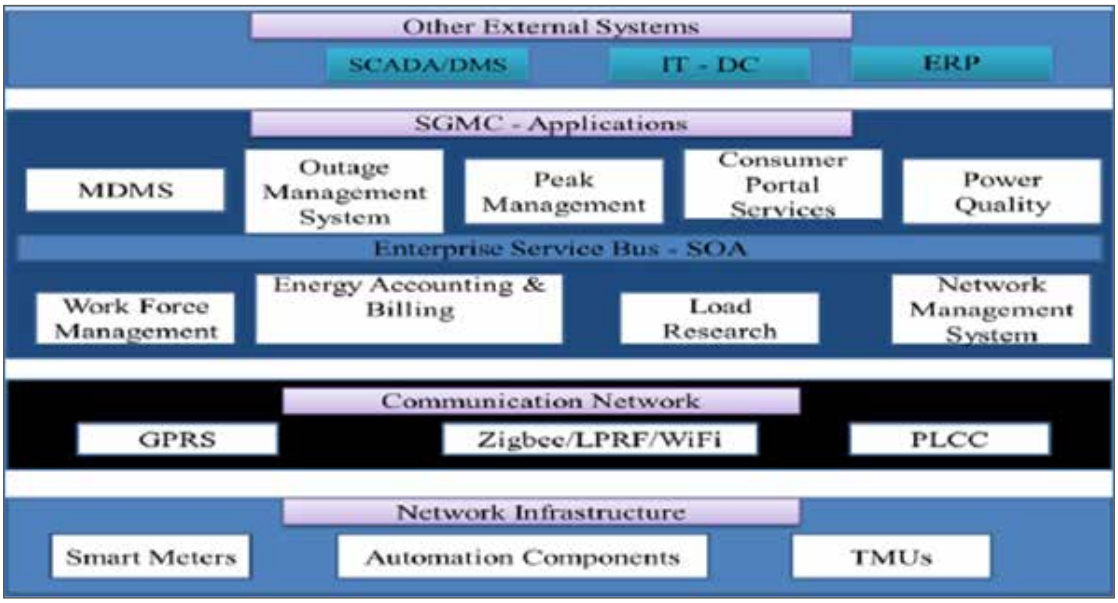
- Smart Grid pilot project in Jeedimetla Industrial Area, Ranga Reddy District is one among the 14 pilots approved by Ministry of Power, Govt. of India.
- The Project is approved on 09-04-2013 at a cost is Rs. 41.82 Crores. GOI's Grant is 50% of Project Cost i.e Rs. 20.91Crs
- The Smart grid pilot Project covers 11,904 Consumers including all Categories
- The functionalities of TSSPDCL Smart Grid Pilot Projects are

1. AMI for residential and industrial consumers
   a. Periodic flow of customer meter data and network data in to the data base.
   b. Disseminate DSM / DR programs
   c. Facilitate MDM
   d. Customer empowerment.
   e. Aid peak management through TOU.
2. Peak load Management
   a. To respond to Peak demand or plan moderation.
   b. To level the load curve through DSM, DR, TOU initiatives.
   c. Load Curtailment.
3. Outage Management
   a. FLISR – Fault Location Isolation and Service Restoration.
   b. Minimize outage duration and interruptions
   c. Asset management.
4. Power Quality
   a. To gauge the PQ issues and correct the same.
   b. Improve quality of supply.

By the implementation of this project the DISCOMs will benefit through loss reduction, better outage and peak management on a real time basis, improved power quality thus ultimately matching their goals of achieving higher consumer satisfaction.

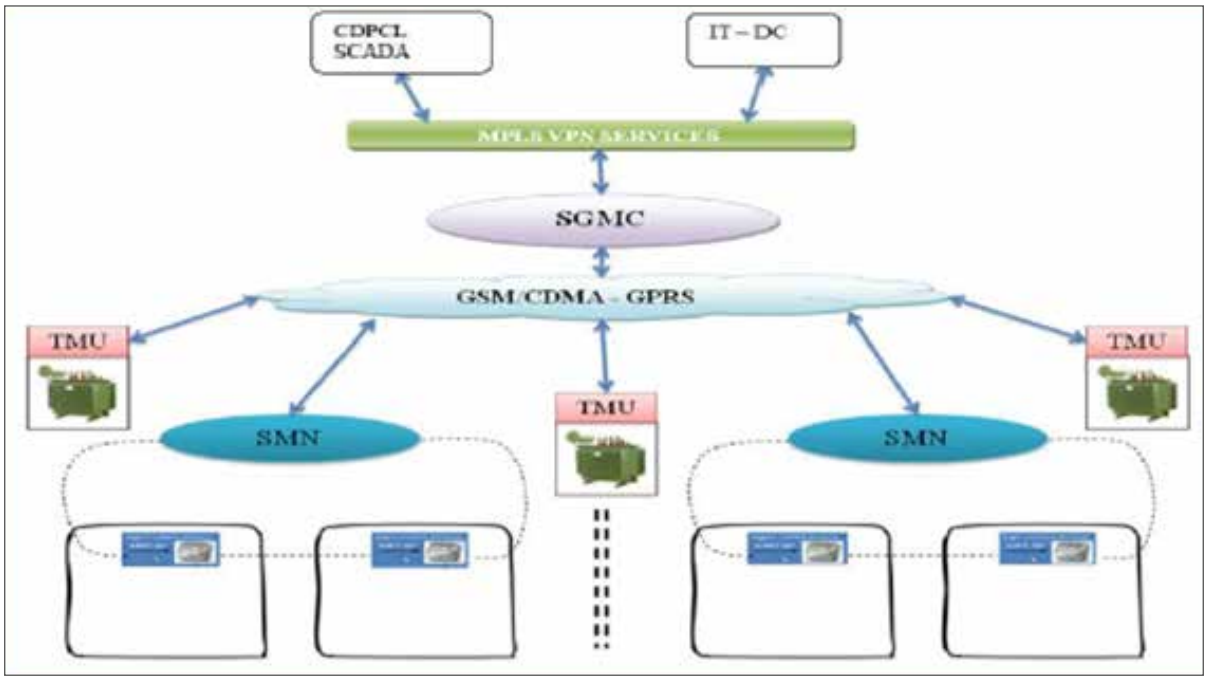
6.4.8.5 System Architecture

SGIA is to submit proposed design giving the system architecture and other subsystem details, communication technologies envisaged. However conceptual overall system architecture is given in figure below. Software applications should facilitate interface to other systems through OPEN interfaces like web services, XML, CSV etc. The communication technology and seamless connectivity are vital for the entire system and SGIA shall consider all possible technologies and propose the feasible and reliable solution. However conceptual communication architecture is shown in fig: 3.2.The SGIA shall suitably evolve an appropriate architecture covering the system components shown in diagrams and additional if any as per the proposed design for the Jeedimetla smart grid pilot project solution



The communication technology and seamless connectivity are vital for the entire system and SGIA shall consider all possible technologies and propose the feasible and reliable solution.

However conceptual communication architecture is shown in the figure below



The SGIA shall suitably evolve an appropriate architecture covering the system components shown in the diagrams and additional if any as per the proposed design for the Jeedimetla smart grid pilot project solution.

6.5 Summary of Investments

6.5.1 Prioritization of investments

TSSPDCL and TSNPDCL have investments planned for INR 9,973 Crores through GoI Schemes like DDUGJY and IPDS. Considering the huge quantum of the investments it is important to prioritize these investments under various heads so that irrespective of the quantum of the grant received from GoI, infrastructure additions which are of at most priority in providing 24 x7 Power For All gets completed first followed by those planned in medium and low.

The same plan is adopted at a circle level to achieve its targets for both the DISCOMs.

6.5.2 TSSPDCL prioritization plan

6.5.2.1 DDUGJY

Of total investments planned under DDUGJY, high priority would be given in utilizing 29% of total investments for AT&C loss reduction measures, 9% for Load Growth and Network Strengthening, 5% for RE plan and 0.4% for DSM measures.

6.5.2.2 IPDS

Similarly, of total investments planned under IPDS scheme, high priority would be given in utilizing 22% of total investments for AT&C loss reduction measures, 23% for Load Growth and Network Strengthening, and 1 % for DSM measures.

6.5.3 TSNPDCL prioritization plan

6.5.3.1 DDUGJY

Of total investments planned under DDUGJY, high priority would be given in utilizing 26% of total investments for AT&C loss reduction measures.

Post these investments, 35% of investments would be used for Load Growth and Network Strengthening, 3% of investments AT & C loss reduction measures, 1% for DSM measures and 33% for RE Plan.

6.5.3.2 IPDS

Similarly, of total investments planned under IPDS scheme, high priority would be given in utilizing 26% for Load Growth and Network Strengthening.

Post these investments, 7 % of investments would be used for Load Growth and Network Strengthening, 25% for Technology upgradation, renovation and modernization, 24 % of investments AT & C loss reduction measures, 3% for DSM measures and 3% for RE Plan.

Detailed prioritization plan is given in Annexure.

TS DISCOMS have planned circle wise investments as mentioned in annexures under DDUGJY and IPDS schemes to handle the circle wise demand.

Total Investments of Rs 8,059 Crs have been planned under DDUGJY & IPDS for TSSPDCL and Rs 1,915 Crs have been planned for TSNPDCL.

Detailed circle wise prioritization of investments have been shared in annexures.

6.5.4 Additional Investments planned on account of 9 Hours of Agriculture Supply

On account of providing 9 Hours of agricultural supply in FY 2016-17 the DISCOMs have planned an investment of INR 1,118 Crs in which network strengthening works include erection/augmentation of new PTRs, erection of 33kV Lines, 33/11kV SS etc.

To be able to provide Power for All 24x7, an investment amount of Rs 7,125 Crs is planned for TSNPDCL and Rs 16,137 Crs is planned for TSSPDCL as mentioned in the above table. These investments include, State Plan, DDUGVY and IPDS, and 9 hours of agricultural supply.

Table 55: The table below summarizes distribution investments under various categories and schemes

Category (Values in Rs. Crs)	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	Total
Load growth and network strengthening	1,420	3,212	3,256	3,015	3,092	13,994
Technology upgradation, renovation and modernization schemes	41	114	110	58	33	357
Measures for bringing down AT&C losses	169	1,283	1,153	851	849	4,305
DSM measures	1	50	54	45	40	191
Renewable Energy Measures	-	236	236	231	66	770
Others (State Plan, R-APDRP)	629	841	870	357	386	3,082
9 Hours of agricultural supply		1,118				
Total	**2,260**	**6,854**	**5,680**	**4,556**	**4,466**	**23,817**

6.6 Adequacy of distribution network

Presently the distribution transformation capacity at 33 kV level is about 15,038 MVA over and above the DISCOMs are planning to add about 7,960 MVA amounting to a total of 22,998 MVA by the end of FY 2018-19. Analysis of the peak load at each voltage levels indicate that the system is capable of handling peak loads which is amounting to only 11,953 MVA at 33 kV level at the end of FY 2018-19. At 11kV voltage level, the existing distribution transformation capacity itself is capable of handling loads to the extent of 19,127 MVA whereas peak load at 11kV voltage level it is expected be only around 10,050 MVA.

6.7 Action plan – State

1. To complete all distribution works necessary for providing 24 x 7 quality supply to all the connection consumers
2. To take necessary steps to meet target trajectory for AT&C loss reduction
3. To identify un-electrified households and ensure 100% electrification of all existing as well as newly constructed households through grid connection as well as off-grid alternatives where grid connection is not feasible
4. To introduce modern technologies for monitoring reliable supply of power like substation automation, automatic meter reading, GIS, Centralized Network Analysis and planning tools, ERP systems and Distribution Management System (DMS) and Outage Management System (OMS).

6.8 Roll-out strategy of Power for All - Distribution Plan

Depending on the grants received from the Central Govt. and in order to declare one of the districts in Telangana State as 'Power For All' by end of FY 2016-17, Medak has been identified on the same lines. In order to achieve this challenging milestone depending on the grants received from the GoI, a roll out plan specific to declare Medak District as 'Power For All' has been designed by the state.

Details of the plan are as follows[7]:

Completion of electrification of 104,032 rural households by end of FY 2016-17.

Table 56: District Specific Electrification Plan - Medak

Districts (TSSPDCL)	FY 15-16	FY 16-17	Total
Medak	31,480	73,452	104,932

Table 57: District Specific roll out plan - Medak

Particulars	Units	2015 - 16		2016 - 17			
		Q3	Q4	Q1	Q2	Q3	Q4
33/11 KV SS Additions	Nos	6	6	7	7	7	7
33/11 KV SS Transformation Capacity	MVA	35	35	45	45	45	45
33 KV Lines	Ckt-kms	112	112	130	130	130	130
11 KV Lines	Ckt-kms	1,193	1,193	1,392	1,392	1,392	1,392
LT Lines	Ckt-kms	3,906	3,906	4,557	4,557	4,557	4,557

Following Medak, the state has identified Nalgonda to be Power For All by end of FY 2017-18 whose plan is as described below.

Table 58: District Specific Electrification Plan - Nalgonda

Districts (TSSPDCL)	FY 15-16	FY 16-17	FY 17-18	Total
Nalgonda	24,296	48,592	48,592	121,480

Table 59: District Specific roll out plan – Nalgonda

Particulars	Units	2015-16		2016-17				2017-18			
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
33/11 KV SS Additions	Nos	6	6	4	4	8	8	4	4	8	7
33/11 KV SS Transformation Capacity	MVA	35	35	20	20	50	50	20	20	50	40
33 KV Lines	Ckt-kms	93	93	93	93	93	93	93	93	93	93
11 KV Lines	Ckt-kms	1039	1039	1039	1039	1039	1039	1039	1039	1039	1039
LT Lines	Ckt-kms	1518	1518	1518	1518	1518	1518	1518	1518	1518	1518

6.8.1 Yearly Roll Out Plan - Connecting the unconnected

Table 60: District wise yearly electrification plan

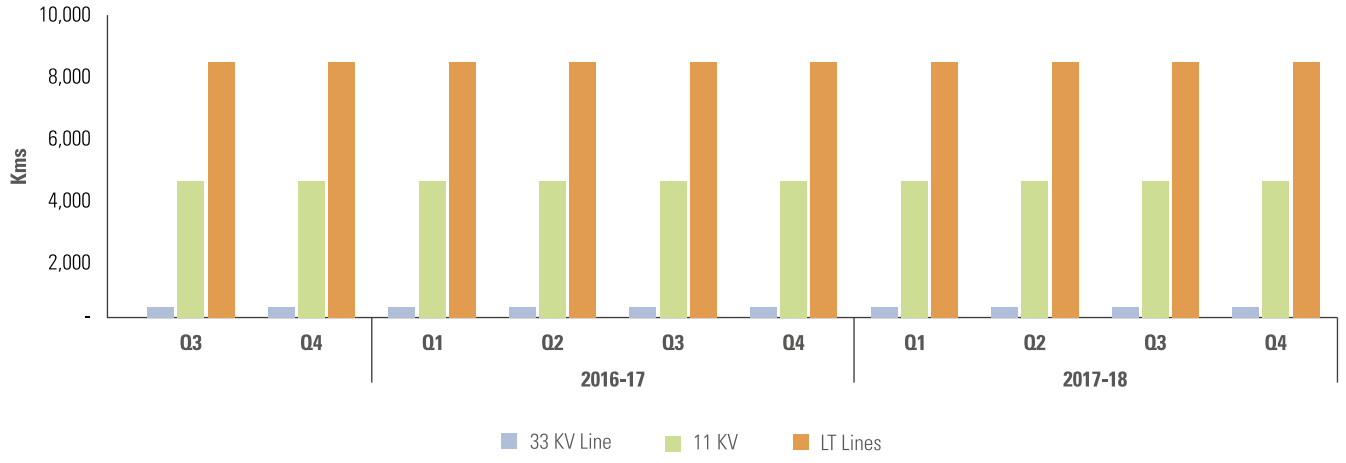
Districts (TSSPDCL)	FY 15-16 (Nos.)	FY 16-17 (Nos.)	FY 17-18 (Nos.)	Total (Nos.)
Mahabubnagar	31,910	63,821	63,821	159,552
Nalgonda	24,296	48,592	48,592	121,480
Medak	20,986	41,973	41,973	104,932
Ranga Reddy	3,121	6,242	6,242	15,604
Total	**80,314**	**160,627**	**160,627**	**401,568**
DDG Scheme	**74**	**146**	**146**	**365**
Districts (TSNPDCL)	**FY 15-16**	**FY 16-17**	**FY 17-18**	**Total**
Warangal	15,382	30,762	30,762	76,906
Karimnagar	15,119	30,238	30,238	75,595
Khammam	10,086	20,171	20,171	50,428
Nizamabad	9,440	18,879	18,879	47,198
Adilabad	13,979	27,957	27,957	69,893
Total	**64,006**	**128,007**	**128,007**	**320,020**
Urban Households	**15,000**	**15,000**	**14,352**	**44,352**

Table 61: Investments planned for connecting the unconnected

Districts (TSSPDCL)	FY 15-16 (INR Crs)	FY 16-17 (INR Crs)	FY 17-18 (INR Crs)	Total (INR Crs)
Mahabubnagar	19	39	39	97
Nalgonda	15	30	30	74
Medak	13	26	26	64
Ranga Reddy	2	4	4	10
Total	**49**	**98**	**98**	**245**
DDG Scheme	**1**	**2**	**2**	**5**
Districts (TSNPDCL)	**FY 15-16 (INR Crs)**	**FY 16-17 (INR Crs)**	**FY 17-18 (INR Crs)**	**Total (INR Crs)**
Warangal	23	45	45	113
Karimnagar	22	44	44	111
Khammam	15	30	30	74
Nizamabad	14	28	28	69
Adilabad	21	41	41	103
Total	**94**	**188**	**188**	**470**
Urban Households	**4**	**4**	**4**	**13**

6.8.2 Year Wise Roll Out of Circuit Lines Additions

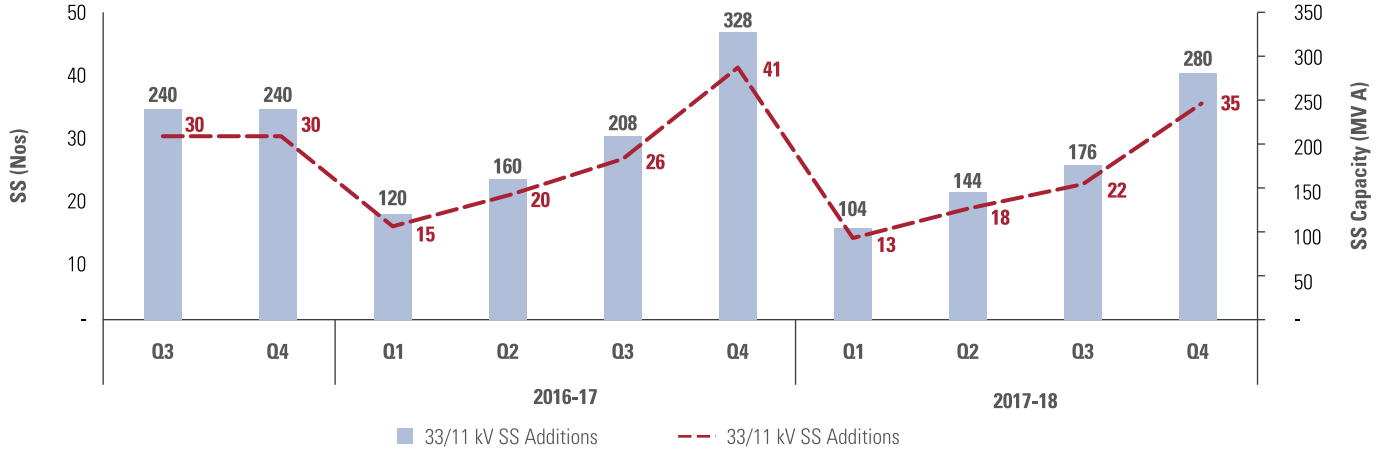
Figure 22: Year Wise Roll Out of Circuit Lines



The figure above shows that on an average each quarter the DISCOMs plan to add about 8,400 Kms of LT Lines, 4500 Kms of 11kV Lines and 300 Kms of 33 kV Lines.

6.8.3 Year Wise Roll Out of SS Additions Planned

Figure 23: Year wise roll-out of substations



TSDISCOMs are planning to add close to 250 33/11 kV Sub Stations during the period FY 2015-16 to FY 2018-19.

Details of implementation plan, circle wise electrification and its investments plans, AT&C Loss Reduction over the next five years is given in Annexures.

6.9 GOI Intervention

1. A total of Rs 9,973 Crores have been proposed as various investments under the GoI notified schemes of IPDS and DDUGJY.
2. It is requested that GoI may extend financial assistance to the extent of Rs 7,480 Crores i.e. 75% of the total investments under the above schemes
3. The above is in addition to the existing schemes of R-APDRP and RGGVY (merged into DDUGJY) already implemented by the GoI

Table below summarized the proposed distribution investments under various GoI schemes and GoI assistance being sought.

The request of Government of Telangana State would be considered by Government of India as per its policies/ frameworks or otherwise Government of Telangana State would make arrangements for funding from other sources.

Table 62: Financial assistance from GoI

Investment summary in Rs Crores	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
IPDS	960	960	754	754	3,428
DDUGJY	1,930	1,930	1,425	1,261	6,545
Total investments under the above schemes	2,890	2,890	2,179	2,015	9,973
Financial Assistance from GOI	**2,167**	**2,167**	**1,634**	**1,511**	**7,480**

07. Financial Viability of Distribution Companies

7. Financial Viability of Distribution Companies

7.1 Financial Position of Distribution Utilities

Accumulated losses for the state Telangana as on 31st March 2013 account for an amount of Rs 11,342 Crs, with TSPDCL accounting for Rs 7,830 Crs and NPDCL accounting for Rs 3,512 Crs

Since the financial health of the DISCOMs are the key for the healthy functioning of the power sector, a scheme of financial restructuring of DISCOMs was formulated by Government of India (GoI) in consultation with the states for ensuring the viability of the DISCOMs. The salient features of the financial restructuring plan (FRP) is as follows –

- 50% of the outstanding short-term liabilities as on 31st March 2012 to be taken over by the state government. This shall be first converted into bonds to be issued by the DISCOMs to participating lenders, duly backed by the state government guarantee. The state government to take over liabilities in the next 2-3 years, keeping in view the fiscal space for taking over the entire loan.
- Balance 50% of the outstanding short term liabilities will be rescheduled by the lenders and to be serviced by the DISCOMs with moratorium of 3 years on principal.

Table 63: Particulars of the bonds issued and the loans restructured by the TS Discoms are as follows

Particulars	TSNPDCL	TSSPDCL
Term loan under FRP	1,225	1,224
Bonds issued under FRP Scheme	1,744	2,810
TS DISCOMS	**2,969**	**4,034**

Both the DISCOMs have reported losses for the FY 2013-14 and FY 2014-15 and the details are shown below

Table 64: Accumulated losses as on 31st March 2015

Particulars	TSNPDCL	TSSPDCL
Accumulated losses as on 31st March 2013	3,512	7,830
Losses incurred in FY 2013-14	33	811
Losses incurred in FY 2014-15 *(Tentative figures as accounts are under preparation)*	696	985
Accumulated losses as on 31st March 2015	**4,240**	**9,626**

Over past ten years, DISCOMs have taken up multiple measures leading to reduction in T&D losses of TSSPDCL from 21.26% in 2001 to 14.87% in 2011, TSNPDCL from 23.30% in 2001 to 14.21% in 2011. This reduction in T&D losses can be owed to investments made in infrastructure additions, increase monitoring, metering of 33KV feeders, 11 KV feeders and substations.

Adding to the T&D losses, the money flow in the system is not uniform. The number of days of receivables by the DISCOM is longer than the number of days of payable leading to strain on the DISCOM finances.

In effect, the cash conversion cycle for DISCOMS is longer than it ought to be and there are multiple reasons for the same.

The key issues Discoms are facing in collecting the cash are:

1. **Metering exceptions:** Multiple issues with the meters include, Meters being stuck up, Meters Burnt out (MBO), Meters are not existing in some locations (MNE), Reading on the meter is not furnished (RNF), Doors locked while collections, Meters showing nil consumption and Meters under dis- connection.
2. **Collection efficiency:** Collection efficiency is defined as the total collections against the demand raised including arrears as mentioned in Table 65
3. **Low Billing efficiency:** For Telangana DISCOMS to achieve AT & C loss below 10%, it is imperative for DISCOMS to achieve a billing efficiency of more than 90%. Therefore DISCOMS should take steps to reduce billing exception cases.
4. **Government Department dues:** There are dues to be paid to Telangana DISCOMS by various Government Departments. Total due amount is for Rs 1774 Crs of which major share is from Panchayat Raj and rural development for Rs 1140 Crs accounting for more than 60% of total due amount.

Table 65: Collection efficiency of DISCOMS
(Source: Discom MIS)

Item	FY 11-12	FY 12-13	FY 13-14	FY 14-15
TSNPDCL	96%	104%	101%	100%
TSSPDCL	98%	101%	95%	100%

It may be noted that collection efficiency for FY 13-14 has reduced from its level in FY 12-13. For FY 2014-15, the collection efficiency of TSSPDCL and TSNPDCL was 100%. There is a need to ensure collection efficiencies are maintained at high levels so as to minimize impact on cash conversion cycle.

5. Agricultural Subsidy Dependence

   Based on the past trend of subsidy requirement of Telangana DISCOMS, Subsidy required to support agricultural sales is primarily growing. This increase is mainly due to

   a. Increase in Cost of Supply (CoS) to Agricultural Category
   b. Increase in Agricultural Sales

Going forward, the dependence on subsidy support is going to increase.

As on 31st March 2015, arrears that have been accumulated due to non-payment of dues by multiple government departments account for Rs 1,774 Crs for TSDISCOMS. Despite two tariff hikes in a row during the period FY2012-13 & FY2013-14, there was only a marginal improvement in recovery of cost in FY 2013-14. Tariff hike did not take place in the FY 2014-15 owing to the state bifurcation that happened during the year.

This indicates that the expenditure during the period also increased commensurately with the incremental revenue, chiefly on account of ever increasing trend in power purchase cost, tariff subsidy, transmission and distribution costs and almost static distribution loss levels amongst others.

7.2 Financial Viability

Ensuring the financial viability of the DISCOMs is the fundamental objective of the FRP scheme. Some of the key commitments on the part of various stakeholders as envisaged in the Scheme vis-a-vis their compliances as of now are given as mentioned in the table below

Table 66: Key commitments of various stake holders

Sl. No.	Commitments	Compliances
1.	Financial Restructuring Plan (FRP) is to be chalked out by the Discoms and to be approved by the state govt. state regulatory commission and by the banks/FIs.	Has been prepared and finalized after approval of all the required stakeholders.
2.	Bonds issued cover the expensive power purchased by the TS Discoms for the period 2008-09 to 2013-14. This is around 40% of the total accumulated losses of the TS Discoms	Bonds amounting to Rs. 4060.73 Cr. have been issued to the various banks
3.	Remaining losses short term loans outstanding as on 31st March 2012 are to be restructured for a period of 10 years with a moratorium on principal of 3 years;	Outstanding short term loans amounting to Rs. 2450 Cr. have been restructured by the banks.
4.	Filing of tariff petitions regularly.	Being done regularly.
5.	Pass through of adjustment of fuel cost to offset power purchase cost.	Under clause 45-B of Commission's Conduct of Business Regulations as amended vide Regulation No.1 of 2003 read with Section 62(4) of the Electricity Act, 2003 and Retail Supply Tariff Order (T.O.) for 2012-13, additional cost of fuel and power purchase costs have to be passed on to the consumers as Fuel Surcharge Adjustment (FSA) on quarterly basis as per the terms of fuel surcharge formula specified under the said Regulation
6.	Constitution of monitoring committees	TSERC Advisory Committee was formed and 1st meeting was proposed to be held on 04th march 2015
7.	Central Govt. would provide incentive by way of grant i. equal to the value of the additional energy saved by way of accelerated AT&C loss reduction i.e. reduction beyond 1.5% annually; and ii. 25% of reimbursement to the state Govt. of bonds taken over by the latter.	To be complied with in due course.
8.	100% consumer metering.	100% Feeder Metering and Consumer Metering has been achieved for both the DISCOMs TSSPDCL and TSNPDCL.
9.	Outstanding dues of State Govt. departments to be paid off till 31st March 2015	Arrears to be paid Rs 1,774 Crs

7.3 Loss Reduction, energy Management & Energy Accounting

The high T&D loss levels in the Discoms remains a concern and all efforts are made to reduce the distribution losses to improve the financial health of the Discoms. To manage this effectively a concrete plan for energy management, energy accounting and loss reduction shall be put into place.

The Targets for T&D losses for FY 2015 onwards is given in Table 67. Reduction of 1% in T&D losses would result in savings of 487.37 MU annually based on FY 2013-14 energy requirement.

Table 67: DISCOM Wise T&D Loss Trajectory

Year	FY 15-16	FY 16-17	FY 17-18	FY 18-19
TSSPDCL	13.32%	12.76%	12.22%	11.70%
TSNPDCL	13.71%	13.17%	12.65%	12.15%

Before embarking on the journey of loss reduction, baseline AT&C losses should be re-established for the both the DISCOMs. It is proposed to undertake energy audit to remove the ambiguity in terms of loss level.

Some of the steps which are needed for reducing the subsidy burden are:

1. Metering measures:
    - Short term: Metering of all mother DTRs which supply power to agriculture and other consumers to be immediately undertaken
    - Medium term: Metering of all agricultural DTRs to be undertaken.
    - Long term: Metering of agricultural consumers to be undertaken

The above would help in segregating agriculture sales from losses and this would portray the actual loss levels of DISCOMS.

2. Re-survey of all the agricultural services is needed for greater subsidy targeting. As per Government Policy, small and marginal farmers need to be provided with subsidy. Resurvey of agricultural services will aid in identification of the small and marginal farmers.
3. Implementation of HVDS on a larger scale, covering segregation of all agricultural feeders needs to be taken up.
4. Demand side management needs to be taken up which would entail measures such as
    - Mandatory installation of capacitors
    - Insistence on use of ISI marked pump sets for increased efficiency
    - Installation of solar pump sets in areas with high water table with technical and financial support from MNRE.

7.4 Profit and Loss Projections

7.4.1 Assumptions behind arriving at Profit and Loss Projections

Table 68: Key Assumption for base case in Profit and Loss projections of TSDISCOMs

Sl. No.	Particulars	Key Assumptions
1.	Power Purchase	• Telangana Share of 53.89% considered for stations with existing PPA • 100% share to TS from upcoming TSGENCO Stations • Considered energy from all generating stations as per their respective commercial operations date • Short term purchases considered till the existing PPA and any shortfall in energy will be met through market purchases
2.	Power Purchase Rate	• Actual Power purchase costs have been considered for FY 14-15 is Rs 3.79/KWh • No escalation in PP cost considered • PP cost of upcoming Thermal stations is projected as Rs. 4.24/kWh • PP Cost for upcoming plans computed based on the cost per MW arriving at Variable and Fixed Cost • Short Power power is purchased at the rate of Rs. 5.94/kWh
3.	Sales and Revenue	• Revenue from sales is based on the actual tariff for FY 2014-15 and approved tariff for FY 15-16 is used for projections. • Revenue from tariff incorporates the current sales mix considered in demand supply projections. • No Tariff hike considered till FY 2018-19 • Subsidy support from GoTS at levels of 20% to 22% of total revenues till FY 2018-19 • Surplus plus is being sold at the rate of Rs 4.5/ kWh
4.	Losses (%)	**Losses** / **FY 14-15** / **FY 15-16** / **FY 16-17** / **FY 17-18** / **FY 18-19** AT&C[8] / 12.61% / 11.46% / 10.95% / 9.70% / 9.00% Transmission / 4.15% / 4.10% / 4.05% / 4.00% / 3.95% • Collection efficiency considered – 100% from FY 14-15 to FY 18-19
5.	Capex and Capitalization	• Capex as per budgeted plans & requirement to fulfill PFA targets • Capitalization for new investments is 60% in the investment year and the rest 40% in the next year
6.	Employee, R&M and A&G Costs	• Employee Cost as per MYT order of TSERC for the 3rd control period • A & G expenses - Figures as per MYT order escalated for increased by 5% to account for increased network additions • R & M expenses - 1.92% of the GFA based on the network additions planned
7.	Depreciation	• **For Existing Assets:** 7.9% for TSSPDCL & 6.9% for TSNPDCL as per Discom input • **For new Assets:** Assumed at 5.28% for new asset addition from FY 15-16
8.	Funding of CAPEX	• Grants to the extent of 60% of DDUGJY and IPDS Schemes upfront and 15% after achieving milestones. • R-APDRP Part A & SCADA 100% of project cost to be given as grant & in part-B 50% of project cost to be given as grant • State Government Commitment on FRP • Interest on new Debt considered as 12% • 70:30 of remaining CAPEX after accounting for grants & consumer contribution
9.	Working Capital and Cash Deficit Loan	• Working capital is assumed as 1 month of O&M Expenses • Interest rate assumed as 13.5% for Cash deficit funding & Working capital
10.	Other Income	• Theft of Power, DPS Income, Other Operating Revenue • Sales of surplus power (FY 18-19 @4.45 Rs/unit)
11.	Miscellaneous Expenses	Interest on consumer security deposit (CSD) @10%, CSD is two months of net sales. Provisions for Bad debts @1% of total Revenue.
12.	Regulatory Parameters	Assuming periodic True-up
13.	Other Assumptions	• 5% of total energy requirement at grid level is considered as Reserve margin each year from FY 2015-16 to FY 2018-19. • Reserve margin is only considered for energy management purpose and is not used for calculating either power purchase or sale of Power. • For FY 15-16 financials include costs due to additional power purchased at market rate of Rs. 5.94/kWh to meet the demand at grid level over and above the projected energy available • For FY 16-17 to FY 18-19, revenue due to additional sale of power has also been considered at the rate of Rs. 4.5 /kWh • Projections are based on provisional accounts of FY 14-15 received from DISCOMS

8 AT&C Loss with 100% collection efficiency considered

7.4.2 Scenario 1 – Base Case

Table 69 Parameters for Base Case

Particulars	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Energy related parameters					
Sales	**MUs**	48,774	60,281	76,349	88,210
Energy Requirement at Grid Level	**MUs**	57441	70554	88071	100928
Total M.U available for sale at Grid level	**MUs**	56,236	70,599	88,546	114,593
Surplus/ (Deficit) at grid Level	**MUs**	(1,204)	46	475	13,666
T&D Loss	**%**	15.09%	14.56%	13.31%	12.60%
AT&C Losses	**%**	11.46%	10.95%	9.70%	9.00%
Power Purchase cost	**Rs/kWh**	4.09	4.02	4.13	4.26
Revenue & Expenditure Parameters					
Tariff increase	**%**	0%	0%	0%	0%
Collection Efficiency	**%**	100%	100%	100%	100%
Average billing rate	**Rs./kWh**	4.46	4.27	4.46	4.54
Employee Cost escalation as per TSERC MYT order	**%**	11%	18%	16%	16%
A&G Cost Escalation as per TSERC MYT order, adjusted for PFA investments	**%**	6%	15%	14%	13%

Table 70: Profit and Loss Projections of TSDISCOMs in INR Crores

Particulars	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Income					
Net Sales	Rs. Crs	21,761	25,789	34,232	46,165
Other Income	Rs. Crs	1,698	1,750	1,805	1,862
Subsidy	Rs. Crs	4,270	5,500	6,832	8,700
Total Income	**Rs.Crs**	**27,729**	**33,040**	**42,868**	**56,728**
Expenditure					
Transmission Charges	Rs. Crs	1,186	1,619	1,960	2,671
Power & Fuel Cost	Rs. Crs	23,470	28,401	36,529	48,803
Employee Cost	Rs. Crs	1,474	1,736	2,009	2,323
A&G Costs	Rs. Crs	389	457	529	611
R&M Costs	Rs. Crs	248	356	491	602
Others	Rs. Crs	311	378	484	656
Total Expenses	**Rs. Crs**	**27,077**	**32,947**	**42,002**	**55,666**
Operating Profit	Rs. Crs	652	92	866	1,062
PBDIT	Rs. Crs	652	92	866	1,062
Interest	Rs. Crs	1,794	2,548	3,060	3,822
PBDT	Rs. Crs	(1,142)	(2,455)	(2,193)	(2,760)
Depreciation	Rs. Crs	912	1,207	1,504	1,755
Profit Before Tax	Rs. Crs	(2,054)	(3,662)	(3,697)	(4,515)
Provision for bad debts	Rs. Crs	277	330	429	567
PBT (Profit before exceptional & extraordinary items & tax)	Rs. Crs	(2,331)	(3,993)	(4,126)	(5,082)
Reported Net Profit	**Rs. Crs**	**(2,331)**	**(3,993)**	**(4,126)**	**(5,082)**
Accumulated Losses	**Rs. Crs**	**(16,198)**	**(20,190)**	**(24,316)**	**(29,398)**

The accumulated losses are mainly because of the uunapproved portion of Fuel Surcharge Adjustment (FSA) for the year FY 2009-10 to FY 2011-12, FSA cases pending courts. The Hon'ble TSERC needs to recognize this losses and permit the licensees in the state to recover the above amounts through an increase in tariffs.

FRP bonds are included as part of share capital disbursed over three years in equal tranches starting in FY 15-16. All investment requirement after accounting for grants & consumer contribution as being funded in 70:30 Debt to equity ratio.

Table 71 Cash Flow Projection for TSDISCOMS - Base Scenario

	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Cash Flow statement					
Cash flow from operations					
Revenue	Rs. Crs	27,729	33,040	42,868	56,728
Operating costs	Rs. Crs	(26,766)	(32,569)	(41,518)	(55,010)
Miscellaneous expenses	Rs. Crs	(311)	(378)	(484)	(656)
Increase in short term capital requirement	Rs. Crs	-	-	-	-
Tax	Rs. Crs	-	-	-	-
Net cash from operations	Rs. Crs	652	92	866	1,062
Cash from investment activities					
Capex	Rs. Crs	(7,744)	(6,534)	(5,253)	(5,126)
Net cash from investment activities	Rs. Crs	(7,744)	(6,534)	(5,253)	(5,126)
Cash from financing activities					
Equity investments	Rs. Crs	3,650	3,228	2,880	1,324
Cash from CSD	Rs. Crs	623	671	1,407	1,989
Debt drawn	Rs. Crs	4,976	3,992	3,178	3,089
Loan repayment	Rs. Crs	(800)	(1,390)	(1,668)	(1,870)
Increase in working capital loan	Rs. Crs	(50)	37	40	42
Payment of past current liabilities	Rs. Crs	-	-	-	-
Grants + Consumer service connections	Rs. Crs	635	831	713	713
Interest on cash deficit loan	Rs. Crs	(24)	(137)	(207)	(627)
Interest on loans- Excluding Cash deficit Interest	Rs. Crs	(1,746)	(2,382)	(2,819)	(3,155)
Interest on working capital Loan	Rs. Crs	(24)	(29)	(34)	(40)
Net cash from financing activities	Rs. Crs	7,240	4,822	3,490	1,465
Net cash balances	Rs. Crs	-	-	-	-
Cash BF	Rs. Crs	338	486	(1,133)	(2,030)
Cash flow during the year	Rs. Crs	149	(1,620)	(896)	(2,599)
Cash	Rs. Crs	486	(1,133)	(2,030)	(4,629)

The healthy cash Scenario for the DISCOMS in the initial years is due to the influx of cash in the form of equity as part of the FRP funds.

7.4.3 Measures to reduce losses

Measures initiated for energy audit and accounting with IT intervention need to be strengthened and expanded in other areas. To meet the objective, the backbone infrastructure for improving measurement and visualization should be created across the state and would include:

1. Implementation of Geographic Information Systems (GIS) to map the network assets and consumers comprehensively and always updated for operational purposes. Activities that would be supported by the GIS capabilities would include fault detection and restoration, new service connection issuance, connection – disconnection, network expansion, etc. To achieve its real potential accuracy and regular updating of asset & consumer mapping needs to be carried out both for the existing and new set of asset and consumer. It is also important for the utility to identify and regularly update the incremental changes that is happening in the network.
2. Government should take up installation of meter for in all the distribution transformer & feeder in the urban areas in the state. A comprehensive feeder and distribution transformer metering programme needs to be rolled out that would cover all feeders and transformers in the State. Measures in this regard need to be made comprehensive, and should be backed by an expeditious restoration plan in case the meters turn defective or damaged;
3. Metering standards and standard installation guidelines needs to be formulated before procurement & installation of meter.
4. A properly devised pricing policy can create incentives for the consumers to shift load from peak hours to off peak hours.
5. Advanced Metering Infrastructure (AMI) is a system which allows the utilities to remotely measure, collect, and analyze the consumption data. The foundation blocks of AMI includes smart meters, associated hardware, software, data management, programming and communications devices that collect time-differentiated energy usage from smart meters. Smart Meters which constitute one of the vital components of AMI are new generation of meters which are capable to simultaneously perform basic functionality of core metering and advance functionalities like sending meter data via Head End System (HES) using two-way remote communication network, giving access to utility to execute remote commands like load connect/ disconnect, ability to inform consumer about real time pricing/ time of usage and performing periodic meter maintenance via over the air firmware upgrades. Data collected from meters are processed for various applications like billing, consumption analysis, outage management, address customer grievances etc. Govt. of Telangana may draw a roadmap for implementation of AMI in a phased manner starting with big cities and towns in the State.
6. Network analysis of the system to base on power flows and network status to ensure that the losses and line outages can be predicted or identified in a timely manner. Through change in process management, DISCOMS have to ensure that the entire new capital investment program are routed through network analysis module rather than existing stopgap approach.
7. Loss measurement and verification methodology implemented through external agencies to be implemented.
8. To carry out independent feeder-wise energy audits that would be carried out by the independent energy audit agency at the corporate office and reporting directly to the management.
9. Aggressive vigilance checking shall be intensified.

For this purpose, external verification through competent accredited certification agencies shall be taken up. Such agencies shall carry out an annual verification of the energy accounting and audit facilities, the energy measurements of the utilities and rate them on various parameters to ensure that the loss measurements and supply parameters for the 24X7 supply are transparent and credible.

7.5 Sensitivity Analysis and Impact on Tariff

The following parameters have been assumed in calculating the impact on tariff and additional costs incurred while providing 24x7 Power For All

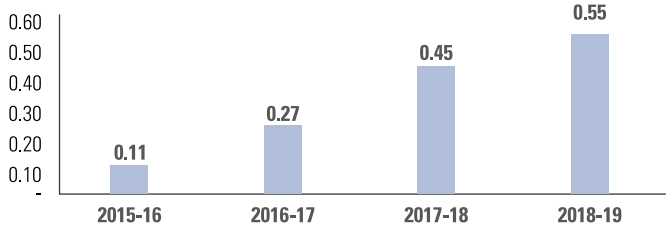
- Additional Energy Requirement as per the sales projections considered for PFA
- Cost due to additional power purchase and T&D Costs for infrastructure additions for distribution & transmission.

Table 72: Additional Cost and Impact on tariff computation

Parameters (INR Crs)	Unit	2015-16	2016-17	2017-18	2018-19
Total Energy available for billing	MU	48,774	60,281	76,349	88,210
Additional Energy for billing	MU	2,975	9,348	19,502	24,761
Procurement of energy for supply	MU	56,236	70,599	88,546	114,593
Additional Energy for supply	MU	3,679	11,488	23,621	29,747
Total Power Purchase Cost	Rs. Crs	23,470	28,401	36,529	48,803
Avg PP Cost	Rs/kWh	4.09	4.02	4.13	4.26
Cost due to additional power purchase	Rs. Crs	1,503	4,621	9,745	12,669
Additional Annual T&D Infrastructure Cost	Rs. Crs	385	1,287	2,564	3,492
Total Cost of additional Energy	Rs. Crs	1,888	5,909	12,308	16,160
Average Revenue on subsidy received basis (Revenue at current tariff)	Rs/kWh	4.55	4.55	4.55	4.55
Average Revenue received from sale of additional energy	Rs. Crs	1,354	4,255	8,876	11,270
Additional Cost	Rs. Crs	534	1,654	3,432	4,891
Impact on Tariff	**Rs/kWh**	**0.11**	**0.27**	**0.45**	**0.55**

The figure below shows the impact on tariff on account of the additional investments planned while providing 24x7 Power For All.

Figure 18: Year Wise Addition of Transmission Lines



7.6 Sensitivity Analysis

The following parameters have been assumed in calculating the impact on tariff

Table 73: Sensitivity Analysis for impact on tariff due to various scenario assumed

Scenario	Units	2015-16	2016-17	2017-18	2018-19
Base Case	Rs/kWh	0.11	0.27	0.45	0.55
No Grants from MoP	Rs/kWh	0.11	0.28	0.46	0.56
1 % Increase in AT & C Loss	Rs/kWh	0.11	0.28	0.46	0.55
Nil Accumulated Losses	Rs/kWh	0.09	0.23	0.39	0.48

Table 74: Tariff Increase required to overcome the year on year cash losses

Scenario	Type	Accumulated loss by FY 2018-19 (INR Crs)	Average tariff increase required to avoid losses in the year 2018-19
Scenario 1	Base Case	(29,398)	12.70%
Scenario 2	Nil Grants from MoP	(29,951)	13.34%
Scenario 3	1% Additional AT &C Loss	(31,510)	14.19%
Scenario 4	Nil Accumulated Losses	(8,355)	7.15%

7.6.1 No Grant Scenario

In the base case Grants from central government upto the extent of 75% (60% in first year & 15% after two years) of capital cost has been assumed for IPDS &. In case of non-availability of grants the DISCOMS have to fund these assets from debt & equity. This will increase the cumulative losses for Discoms to Rs. 29,951 crores in FY 18-19 compared to Rs. 29,398 crores in the base case mainly due to the higher interest cost incurred on the loan. A tariff increase of 13.34% is required in FY 18-19 for the DISCOM to return to profitability. The impact on Tariff in this scenario due to the PFA program is expected to be in the range of Rs 0.11/kWh to Rs 0.56/kWh.

Table 75 Parameter Table for No Grant Scenario

Particulars	Unit	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Energy related parameters					
Sales	MUs	48,774	60,281	76,349	88,210
Energy Requirement at Grid Level	MUs	57,441	70,554	88,071	1,00,928
T&D Loss	%	15.09%	14.56%	13.31%	12.60%
AT&C Losses	%	11.46%	10.95%	9.70%	9.00%
Power Purchase cost	Rs/kWh	4.05	4.02	4.13	4.26
Revenue & Expenditure Parameters					
Tariff increase	%	0%	0%	0%	0%
Collection Efficiency	%	100%	100%	100%	100%
Average billing rate	Rs./kWh	4.46	4.27	4.46	4.54
Employee Cost escalation as per TSERC MYT order	%	11%	18%	16%	16%
A&G Cost Escalation as per TSERC MYT order, adjusted for PFA investments	%	6%	15%	14%	13%

Table 76: Financial Position of utilities with no grants received from MoP

Parameters (INR Crs)	2015-16	2016-17	2017-18	2018-19
Income				
Revenue from Sales	21,761	25,789	34,232	46,165
Other Income	1,698	1,750	1,805	1,862
Subsidy	4,270	5,500	6,832	8,700
Total Income	**27,729**	**33,040**	**42,868**	**56,728**
Expenses				
Transmission Charges	1,186	1,619	1,960	2,671
Power & Fuel Cost	23,470	28,401	36,529	48,803
Employee Cost	1,474	1,736	2,009	2,323
R&M Costs	389	457	529	611
A&G Costs	248	356	491	602
Others	311	378	484	656
Total Expenses	**27,077**	**32,947**	**42,002**	**55,666**
Operating Profit	652	92	866	1,062
PBDIT	652	92	866	1,062
Interest	1,810	2,611	3,183	3,997
PBDT	(1,158)	(2,518)	(2,316)	(2,936)
Depreciation	920	1,239	1,560	1,833
Profit Before Tax	(2,078)	(3,757)	(3,877)	(4,769)
Provision for bad debts	277	330	429	567
PBT(Profit before exceptional & extraordinary items & tax)	(2,355)	(4,087)	(4,305)	(5,336)
Reported Net Profit	**(2,355)**	**(4,087)**	**(4,305)**	**(5,336)**
Accumulated Losses	**(16,222)**	**(20,309)**	**(24,615)**	**(29,951)**

Table 77: Impact on tariff for nil grant scenario

Parameters (INR Crs)	Unit	2015-16	2016-17	2017-18	2018-19
Total Energy available for billing	MU	48,774	60,281	76,349	88,210
Additional Energy for billing	MU	2,975	9,348	19,502	24,761
Procurement of energy for supply	MU	56,236	70,599	88,546	114,593
Additional Energy for supply	MU	3,679	11,488	23,621	29,747
Total Power Purchase Cost	Rs. Crs	23,470	28,401	36,529	48,803
Avg PP Cost	Rs/kWh	4.09	4.02	4.13	4.26
Cost due to additional power purchase	Rs. Crs	1,503	4,621	9,745	12,669
Additional Annual T&D Infrastructure Cost	Rs. Crs	387	1,302	2,610	3,563
Total Cost of additional Energy	Rs. Crs	1,890	5,923	12,354	16,232
Average Revenue on subsidy received basis (Revenue at current tariff)	Rs/kWh	4.55	4.55	4.55	4.55
Average Revenue received from sale of additional energy	Rs. Crs	1,354	4,255	8,876	11,270
Additional Cost	Rs. Crs	536	1,669	3,478	4,962
Impact on Tariff	**Rs/kWh**	**0.11**	**0.28**	**0.46**	**0.56**

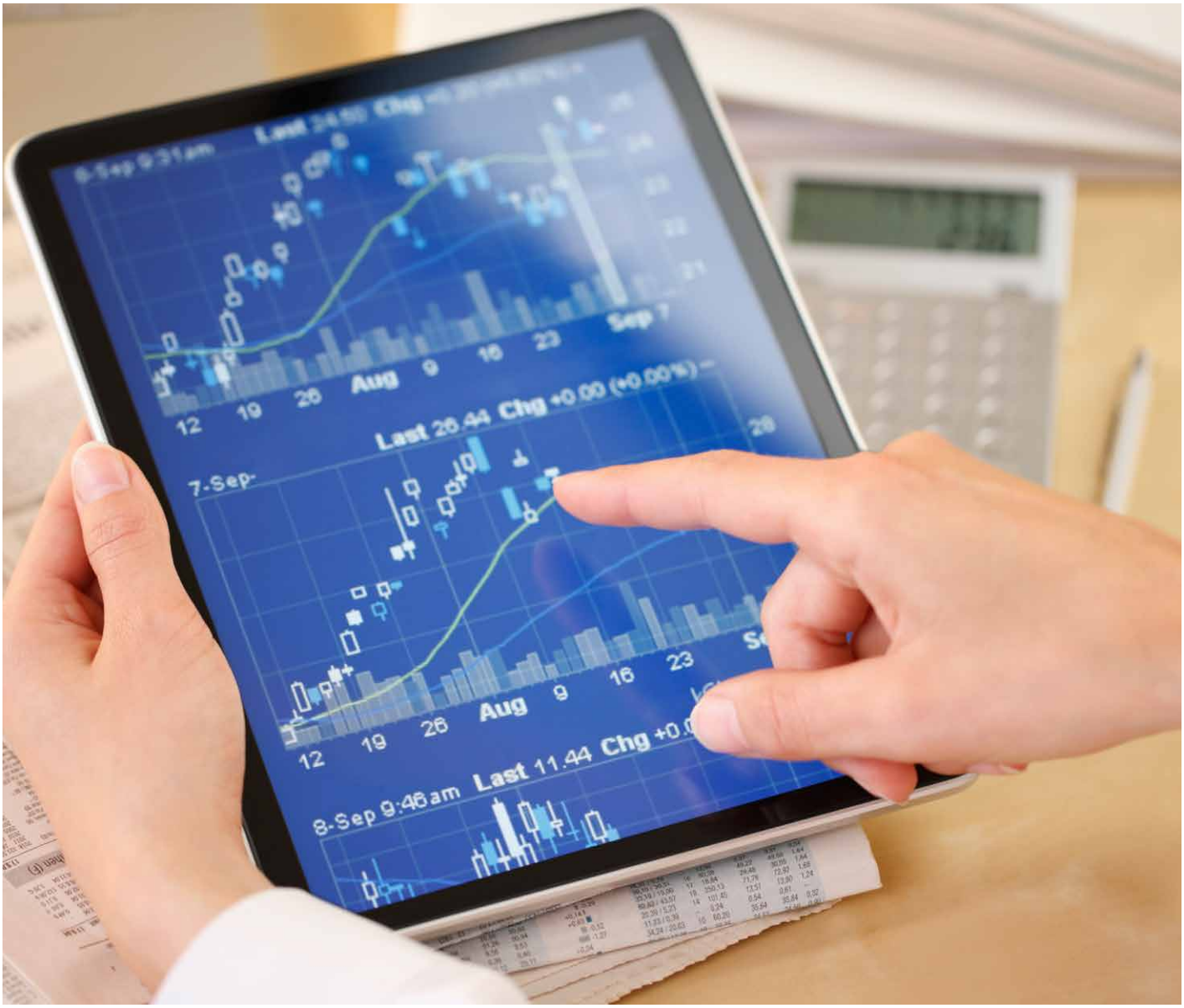


Table 78 Cash Flow Projections - No Grants Scenario

	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Cash Flow statement					
Cash flow from operations					
Revenue	Rs. Crs	27,729.0	33,039.5	42,868.3	56,727.6
Operating costs	Rs. Crs	(26,765.8)	(32,569.0)	(41,518.0)	(55,010.2)
Miscellaneous expenses	Rs. Crs	(311.1)	(378.1)	(483.9)	(655.7)
Increase in short term capital requirement	Rs. Crs	-	-	-	-
Tax	Rs. Crs	-	-	-	-
Net cash from operations	Rs. Crs	652.1	92.5	866.4	1,061.7
Cash from investment activities					
Capex	Rs. Crs	(7,743.9)	(6,533.8)	(5,253.2)	(5,125.9)
Net cash from investment activities	Rs. Crs	(7,743.9)	(6,533.8)	(5,253.2)	(5,125.9)
Cash from financing activities					
Equity investments	Rs. Crs	3,750.8	3,387.8	3,003.6	1,447.8
Cash from CSD	Rs. Crs	623.2	671.5	1,407.0	1,988.9
Debt drawn	Rs. Crs	5,210.7	4,363.6	3,467.3	3,378.1
Loan repayment	Rs. Crs	(811.9)	(1,430.9)	(1,737.6)	(1,961.7)
Increase in working capital loan	Rs. Crs	(50.5)	36.5	40.0	42.2
Payment of past current liabilities	Rs. Crs	-	-	-	-
		-	-	-	-
Grants + Consumer service connections	Rs. Crs	300.0	300.0	300.0	300.0
Interest on cash deficit loan	Rs. Crs	(25.5)	(143.7)	(223.2)	(657.7)
Interest on loans- Excluding Cash deficit Interest	Rs. Crs	(1,760.4)	(2,438.4)	(2,925.4)	(3,299.8)
Interest on working capital Loan	Rs. Crs	(23.7)	(28.7)	(34.1)	(39.8)
Net cash from financing activities	Rs. Crs	7,212.8	4,717.7	3,297.7	1,198.1
		-	-	-	-
Net cash balances	Rs. Crs	-	-	-	-
Cash BF	Rs. Crs	337.8	458.7	(1,264.8)	(2,354.0)
Cash flow during the year	Rs. Crs	120.9	(1,723.6)	(1,089.2)	(2,866.1)
Cash	Rs. Crs	458.7	(1,264.8)	(2,354.0)	(5,220.1)

7.6.2 Increase in AT & C

AT&C loss is a key parameters which significantly impacts the financial position of DISCOM. Any deviation in the base case assumption regarding AT&C losses would further deteriorate the financial position of discom. The relevant scenario has been modelled in this section the assumption for which are given in the table below. The annual financial Losses of the DISCOMs increases to Rs 31,150 Crores in FY 18-19 from Rs 29,398 crores loss in Base case. A tariff increase of 14.19% is required in FY 18-19 for the DISCOM to return to profitability. The impact on Tariff in this scenario due to the PFA program is expected to be in the range of Rs 0.11/kWh to Rs 0.56/kWh

Table 79 Parameters for Increase in AT & C loss Scenario

Particulars	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Energy related parameters					
Sales	MUs	48,774	60,281	76,349	88,210
Energy Requirement at Grid Level	MUs	58,098	71,352	89,060	102,041
Total M.U available for sale at Grid level	MUs	56,236	70,599	88,546	114,593
Surplus/ (Deficit) at grid Level (after adjusting for Losses)	MUs	(1,861)	(753)	(514)	12,552
T&D Loss	%	16.05%	15.52%	14.27%	13.56%
AT&C Losses	%	12.46%	11.95%	10.70%	10.00%
Power Purchase cost	Rs/kWh	4.11	4.04	4.14	4.26
Revenue & Expenditure Parameters					
Tariff increase	%	0%	0%	0%	0%
Collection Efficiency	%	100%	100%	100%	100%
Average billing rate	Rs./kWh	4.46	4.27	4.46	4.54
Employee Cost escalation as per TSERC MYT order	%	11%	18%	16%	16%
A&G Cost Escalation as per TSERC MYT order, adjusted for PFA investments	%	6%	15%	14%	13%

Table 80: Financial Position of utilities with 1% increase in AT & C Loss

Parameters (INR Crs)	Unit	2015-16	2016-17	2017-18	2018-19
Income					
Revenue from Sales	Rs. Crs	21,761	25,769	34,018	45,664
Other Revenue	Rs. Crs	1,698	1,750	1,805	1,862
Subsidy	Rs. Crs	4,270	5,500	6,832	8,700
Total Income	**Rs. Crs**	**27,729**	**33,019**	**42,655**	**56,226**
Expenses					
Transmission Charges	Rs. Crs	1,186	1,619	1,960	2,671
Power & Fuel Cost	Rs. Crs	23,860	28,848	36,834	48,803
Employee Cost	Rs. Crs	1,474	1,736	2,009	2,323
R&M Costs	Rs. Crs	389	457	529	611
A&G Costs	Rs. Crs	248	356	491	602
Others	Rs. Crs	311	378	484	656
Total Expenses		**27,467**	**33,394**	**42,307**	**55,666**
Operating Profit	Rs. Crs	262	(375)	348	561
PBDIT	Rs. Crs	262	(375)	348	561
Interest	Rs. Crs	1,814	2,593	3,134	3,923
PBDT	Rs. Crs	(1,553)	(2,968)	(2,786)	(3,363)
Depreciation	Rs. Crs	912	1,207	1,504	1,755
Profit Before Tax	Rs. Crs	(2,464)	(4,175)	(4,290)	(5,117)
Provision for bad debts	Rs. Crs	277	330	427	562
PBT (Profit before exceptional & extraordinary items & tax)	Rs. Crs	(2,742)	(4,505)	(4,716)	(5,680)
Reported Net Profit	**Rs. Crs**	**(2,742)**	**(4,505)**	**(4,716)**	**(5,680)**
Accumulated Losses	**Rs. Crs**	**(16,608)**	**(21,114)**	**(25,830)**	**(31,510)**

Table 81: Impact on tariff for 1% increment in AT&C Loss Trajectory

Parameters (INR Crs)	Unit	2015-16	2016-17	2017-18	2018-19
Total Energy available for billing	MU	48,774	60,281	76,349	88,210
Additional Energy for billing	MU	2,975	9,348	19,502	24,761
Procurement of energy for supply	MU	56,236	70,599	88,546	114,593
Additional Energy for supply	MU	3,679	11,488	23,621	29,747
Total Power Purchase Cost	Rs. Crs	23,860	28,848	36,834	48,803
Avg PP Cost	Rs/kWh	4.11	4.04	4.14	4.26
Cost due to additional power purchase	Rs. Crs	1,511	4,645	9,770	12,669
Additional Annual T&D Infrastructure Cost	Rs. Crs	386	1,294	2,583	3,520
Total Cost of additional Energy	Rs. Crs	1,897	5,939	12,352	16,189
Average Revenue on subsidy received basis (Revenue at current tariff)	Rs/kWh	4.55	4.55	4.55	4.55
Average Revenue received from sale of additional energy	Rs. Crs	1,354	4,255	8,876	11,270
Additional Cost	Rs. Crs	543	1,684	3,476	4,919
Impact on Tariff	**Rs/kWh**	**0.11**	**0.28**	**0.46**	**0.56**

Table 82 Cash Flow Projections - 1% increment in AT&C Loss Trajectory

	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Cash Flow statement					
Cash flow from operations					
Revenue	Rs. Crs	27,729.0	33,019.0	42,654.5	56,226.5
Operating costs	Rs. Crs	(27,156.2)	(33,016.1)	(41,823.1)	(55,010.2)
Miscellaneous expenses	Rs. Crs	(311.1)	(378.1)	(483.9)	(655.7)
Increase in short term capital requirement	Rs. Crs	-	-	-	-
Tax	Rs. Crs	-	-	-	-
Net cash from operations	Rs. Crs	261.7	(375.2)	347.5	560.6
Cash from investment activities					
Capex	Rs. Crs	(7,743.9)	(6,533.8)	(5,253.2)	(5,125.9)
Net cash from investment activities	Rs. Crs	(7,743.9)	(6,533.8)	(5,253.2)	(5,125.9)
Cash from financing activities					
Equity investments	Rs. Crs	3,650.4	3,228.4	2,879.8	1,323.9
Cash from CSD	Rs. Crs	634.2	671.5	1,407.0	1,988.9
Debt drawn	Rs. Crs	4,976.3	3,991.7	3,178.2	3,089.1
Loan repayment	Rs. Crs	(800.1)	(1,390.1)	(1,667.8)	(1,869.9)
Increase in working capital loan	Rs. Crs	(50.5)	36.5	40.0	42.2
Payment of past current liabilities	Rs. Crs	-	-	-	-
Grants + Consumer service connections	Rs. Crs	634.9	831.3	712.9	712.9
Interest on cash deficit loan	Rs. Crs	(44.3)	(182.7)	(280.9)	(728.7)
Interest on loans- Excluding Cash deficit Interest	Rs. Crs	(1,746.4)	(2,381.5)	(2,818.7)	(3,154.8)
Interest on working capital Loan	Rs. Crs	(23.7)	(28.7)	(34.1)	(39.8)
Net cash from financing activities	Rs. Crs	7,230.7	4,776.5	3,416.5	1,363.9
Net cash balances	Rs. Crs	-	-	-	-
Cash BF	Rs. Crs	337.8	86.3	(2,046.2)	(3,535.4)
Cash flow during the year	Rs. Crs	(251.5)	(2,132.5)	(1,489.2)	(3,201.4)
Cash	Rs. Crs	86.3	(2,046.2)	(3,535.4)	(6,736.8)

7.6.3 Nil Accumulated Losses.

In this Scenario it is assumed that all outstanding cumulative losses are taken over by the Government. This will result in short term & Long term loans being taken off the DISCOMS books resulting in lower interest costs & improved overall financial health

Table 83: Parameter Table for Nil accumulated Loss scenario

Particulars	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Energy related parameters					
Sales	MUs	48,774	60,281	76,349	88,210
Energy Requirement at Grid Level	MUs	57.441	70,554	88,071	1,00,928
Total M.U available for sale at Grid level	MUs	56,236	70,599	88,546	114,593
Surplus/ (Deficit) at grid Level	MUs	(1,204)	46	475	13,666
T&D Loss	%	15.09%	14.56%	13.31%	12.60%
AT&C Losses	%	11.46%	10.95%	9.70%	9.00%
Power Purchase cost	Rs/kWh	4.09	4.02	4.13	4.26
Revenue & Expenditure Parameters					
Tariff increase	%	0%	0%	0%	0%
Collection Efficiency	%	100%	100%	100%	100%
Average billing rate	Rs./kWh	4.46	4.27	4.46	4.54
Employee Cost escalation as per TSERC MYT order	%	11%	18%	16%	16%
A&G Cost Escalation as per TSERC MYT order, adjusted for PFA investments	%	6%	15%	14%	13%

Table 84: Financial Position of utilities with nil Accumulated Losses scenario

Parameters (INR Crs)	Unit	2015-16	2016-17	2017-18	2018-19
Income					
Revenue from Sales	Rs. Crs	21,761	25,789	34,232	46,165
Other Revenue	Rs. Crs	1,698	1,750	1,805	1,862
Subsidy	Rs. Crs	4,270	5,500	6,832	8,700
Total Income	**Rs. Crs**	**27,729**	**33,040**	**42,868**	**56,728**
Expenses					
Transmission Charges	Rs. Crs	1,186	1,619	1,960	2,671
Power & Fuel Cost	Rs. Crs	23,470	28,401	36,529	48,803
Employee Cost	Rs. Crs	1,474	1,736	2,009	2,323
R&M Costs	Rs. Crs	389	457	529	611
A&G Costs	Rs. Crs	248	356	491	602
Others	Rs. Crs	311	378	484	656
Total Expenses		**27,077**	**32,947**	**42,002**	**55,666**
Operating Profit	Rs. Crs	652	92	866	1,062
PBDIT	Rs. Crs	652	92	866	1,062
Interest	Rs. Crs	393	864	1,190	1,600
PBDT	Rs. Crs	259	(771)	(324)	(538)
Depreciation	Rs. Crs	912	1,207	1,504	1,755
Profit Before Tax	Rs. Crs	(653)	(1,978)	(1,828)	(2,293)
Provision for bad debts	Rs. Crs	277	330	429	567
PBT (Profit before exceptional & extraordinary items & tax)	Rs. Crs	(930)	(2,308)	(2,256)	(2,860)
Reported Net Profit	**Rs. Crs**	**(930)**	**(2,308)**	**(2,256)**	**(2,860)**
Accumulated Losses	**Rs. Crs**	**(930)**	**(3,238)**	**(5,495)**	**(8,355)**

Table 85: Impact on tariff for Nil Accumulated losses scenario

Parameters (INR Crs)	Unit	2015-16	2016-17	2017-18	2018-19
Total Energy available for billing	MU	48,774	60,281	76,349	88,210
Additional Energy for billing	MU	2,975	9,348	19,502	24,761
Procurement of energy for supply	MU	56,236	70,599	88,546	114,593
Additional Energy for supply	MU	3,679	11,488	23,621	29,747
Total Power Purchase Cost	Rs. Crs	23,470	28,401	36,529	48,803
Avg PP Cost	Rs/kWh	4.09	4.02	4.13	4.26
Cost due to additional power purchase	Rs. Crs	1,503	4,621	9,745	12,669
Additional Annual T&D Infrastructure Cost	Rs. Crs	300	1,026	2,086	2,868
Total Cost of additional Energy	Rs. Crs	1,803	5,648	11,831	15,537
Average Revenue on subsidy received basis (Revenue at current tariff)	Rs/kWh	4.55	4.55	4.55	4.55
Average Revenue received from sale of additional energy	Rs. Crs	1,354	4,255	8,876	11,270
Additional Cost	Rs. Crs	449	1,393	2,955	4,267
Impact on Tariff	**Rs/kWh**	**0.09**	**0.23**	**0.39**	**0.48**

Table 86 Cash Flow Projections – Nil accumulated losses Scenario

	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Cash Flow statement					
Cash flow from operations					
Revenue	Rs. Crs	27,729.0	33,039.5	42,868.3	56,727.6
Operating costs	Rs. Crs	(26,765.8)	(32,569.0)	(41,518.0)	(55,010.2)
Miscellaneous expenses	Rs. Crs	(311.1)	(378.1)	(483.9)	(655.7)
Increase in short term capital requirement	Rs. Crs	-	-	-	-
Tax	Rs. Crs	-	-	-	-
Net cash from operations	Rs. Crs	652.1	92.5	866.4	1,061.7
Cash from investment activities					
Capex	Rs. Crs	(7,743.9)	(6,533.8)	(5,253.2)	(5,125.9)
Net cash from investment activities	Rs. Crs	(7,743.9)	(6,533.8)	(5,253.2)	(5,125.9)
Cash from financing activities					
Equity investments	Rs. Crs	3,650.4	3,228.4	2,879.8	1,323.9
Cash from CSD	Rs. Crs	623.2	671.5	1,407.0	1,988.9
Debt drawn	Rs. Crs	4,976.3	3,991.7	3,178.2	3,089.1
Loan repayment	Rs. Crs	(637.2)	(928.2)	(963.6)	(1,180.6)
Increase in working capital loan	Rs. Crs	(49.9)	36.5	40.0	42.2
Payment of past current liabilities	Rs. Crs	-	-	-	-
		-	-	-	-
Grants + Consumer service connections	Rs. Crs	634.9	831.3	712.9	712.9
Interest on cash deficit loan	Rs. Crs	-	-	-	(143.2)
Interest on loans- Excluding Cash deficit Interest	Rs. Crs	(369.4)	(834.9)	(1,156.3)	(1,416.7)
Interest on working capital Loan	Rs. Crs	(23.7)	(28.7)	(34.1)	(39.8)
Net cash from financing activities	Rs. Crs	8,804.6	6,967.6	6,064.0	4,376.8
		-	-	-	-
Net cash balances	Rs. Crs	-	-	-	-
Cash BF	Rs. Crs	337.8	2,050.5	2,576.8	4,254.0
Cash flow during the year	Rs. Crs	1,712.7	526.3	1,677.1	312.6
Cash	Rs. Crs	2,050.5	2,576.8	4,254.0	4,566.5

7.7 Managing the risks

Time-bound and successful implementation of the 24X7 Power Supply Scheme is dependent on the some key parameters that are critical to the financial health of the distribution segment.

The performance of the utilities is sensitive to the risks, which must be handled consciously and mitigated accordingly.

1. The burden of short term liabilities needs to be addressed for the sector to turn around for providing reliable 24X7 supply;
2. Investments needs to be efficiently and rigorously planned and adequately financed through cost efficient means. Wherever possible, private financing should be promoted.
3. Energy accounts and AT&C losses needs to be monitored through a comprehensive program;
4. Energy efficiency will be promoted at the end use consumption levels
5. Power procurement and associated risks (including fuel risks) needs to be managed efficiently
6. Release of timely subsidy by the State Government to the Discoms
7. Timely filing of tariff petitions by state utilities to rationalize the tariff so as to reduce the gap between ACS & ARR The above measurers would require strong implementation planning, project monitoring and Information Technology (IT) backbone.

The progress against the FRP and the measures taken to manage the risks of repeated slippage against the FRP objectives shall be monitored independently through the institutional mechanism.

7.8 Roll out strategy: Investment Planning and Monitoring Mechanism

The investments required for 24X7 power supply have already been articulated in the previous chapters. However it is important to ensure that the investments is made on time as per plans and to deliver the desired results. For effective implementation, a Project Monitoring Unit (PMU) is proposed to be established by government of Telangana. The role of the PMU shall be to ensure the following:

- Develop, compile and update (or require the same to be done) detailed project plans for all Capex related to 24X7 supply and related aspects (including the renewable energy related infrastructure and monitoring investments);
- Monitor progress against the plans, analyze and advise the utilities on any delays and bottlenecks on critical measures to promote 24X7 supply and also ensure broader financial viability by tracking measures on loss reduction, investments, etc. and prepare financial/physical progress of the projects as per defined periodicity;
- Timely availability of information about various projects, their sources of the finance, the terms and conditions that govern the projects (including the externally aided projects and those supported by Government of India and Government of Telangana).
- Identify the issues to where intervention of GoI is required and take up these issues with concerned ministries under intimation to MoP
- Arrange initial dialogue/interaction with the external agencies. Support negotiation arranged by the concerned entity/department for project assistance.
- Maintain data base records of projects under its purview in a structured manner and ensure timely availability when required
- To organize the monthly/quarterly review meetings chaired by Chief Secretary/Energy Secretary & Director, PMC.

The PMU shall use state of the art IT tools to ensure that the information on projects tracked is always updated and available in the manner required for decision making by Government of Telangana and other concerned entities. The PMU shall be formed as discussed in subsequent sections.

7.9 GoI Intervention

GoI is being requested to approve the following features:

- Banks/FIs be persuaded to reduce their prevailing rate of interest on working capital loans, facilitating the Discoms to use the savings accrued on account of this less outgo of interest to honor the scheduled repayments.
- The moratorium period as specified in FRP scheme be extended by Banks/FIs by 3 years- accordingly the repayments would commence from April 2018 in place of April 2015;
- Full Operational Funding Requirement be provided by the Banks/FIs for further 3years also i.e. in FY 2015-16, FY 2016-17 and FY 2017-18.

The above request of Govt of Telangana would be considered by Govt of India as per its policies or otherwise Govt of Telangana would make arrangements for funding from other sources..

7.10 Action Points (DISCOMS/State Government)

DISCOMs

- Implementation of FRP including compliances of the mandatory conditions;
- Regular tariff filing and rolling over of tariff orders;
- Regular pass through of fuel cost adjustment;
- Reduction in AT&C losses as per projections
- Timely preparation and finalization of annual accounts

Government of Telangana

- Timely release of subsidy to the Discoms
- Timely adherence to FRP implementation liabilities
- Initiate measures for release of dues from government departments.

08. **Renewable Energy Plan**

8. Renewable Energy Plan

8.1 Existing Renewable Energy Sources

Non-conventional sources (NCE) in the state consist of Biomass, Bagasse, Solar, Wind, Mini Hydel and Waste based power projects. Telangana has large untapped non-conventional energy potential. Total installed capacity of NCE sources is a mere 2% of the total potential. Current energy mix of Telangana is coal-dominated. With coal sources depleting fast and uncertainty and constraints on natural gas availability, there is an urgent need for Telangana to improve its energy mix with higher contribution from NCE sources. Currently share of NCE in Telangana is very low in comparison to other states such as Madhya Pradesh (7%), Rajasthan (24%) and Tamil Nadu (38%).

Table 87: Existing installed capacity of renewable energy sources

All fig in MW	Solar	Wind	Biomass	Bagasse	Others	Total
Existing Capacity	119	400	46	72	26	663

8.2 Capacity Additions Planned

8.2.1 Solar

Telangana has an advantage of high solar insolation at 5.0 m2 and can easily exploit solar potential. Key measures taken by the state to attract solar capacities in the state include

1. The state plans to increase the installed capacity of solar projects from 119 MW in FY 2014-15 to 6,135 MW in FY 2018-19.
2. The state has already concluded bid process for procurement of 515 MW of solar power through tariff-based competitive bidding and has received one of the lowest tariffs in the country with the least tariff being Rs 6.45/unit
3. To further promote participation of solar power, the state has notified an integrated and comprehensive solar policies. Salient features of the policy include:
   a. Facilitation of expeditious approvals through single window clearance
   b. Deemed conversion to Non-agricultural land status
   c. Exemption from Land ceiling Act
   d. The wheeling and transmission charges are exempted for captive use within the state.
   e. Banking of 100% of energy shall be permitted for all Captive and Open Access/ Scheduled consumers during all 12 months of the year
   f. Electricity duty shall be exempted for captive consumption, sale to DISCOMS and third party sale in respect of all SPPs set up within the state
   g. For SPP located within the state and selling power to third parties within the state, 100% exemption shall be provided on the cross subsidy surcharge as determined by TSERC for five years from the date of commissioning of the SPP
   h. 100% refund of VAT/SGST for all the inputs required for solar power projects will be provided by the Commercial Tax Department for a period of 5 years
   i. Industries Department will provide incentive in terms of 100% refund of Stamp Duty for land purchased for setting up solar power project and/or solar parks. Registration charges are payable as per rules
   j. Intra-state Open Access clearance for the tenure of the project will be granted as per TSERC regulations amended from time to time
   k. SPPs using PV or solar thermal technology, being a part of green energy will be given required clearances under pollution control laws within a week by the TSPCB.
   l. The grid-connected SPPs setup for sale to DISCOMs/ captive use/ third party sale will be registered as factories (for the purpose of labor) under the factories act and the entire process shall be completed within a week
   m. The consumers are free to choose either net or gross meter option for sale of power to the DISCOMs under this policy.
4. In addition to the above, the state is planning to set-up GW-scale solar parks/ solar zones over the next five years. A dedicated Green Energy Corridor with evacuation capacity of over 3,500 MW (of which about 3,100 MW of solar capacity is expected to come up in the next five years) is being planned by TSTRASNCO to provide evacuation infrastructure for these solar parks.
5. Other initiatives include implementation of solar pumpsets, solar roof-top systems and solar off-grid systems through the Decentralized Distribution Generation model

Capacity additions planned by the state are scheduled to be Operational as planned below

Table 88: Capacity additions planned in solar energy

All units in MW	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
NCE-Solar Competitive Bidding Phase 1	550				550
NCE-Solar Competitive Bidding Phase 2		2,366			2,366
NCE-Solar parks/ solar zones Upcoming Phase 1			1,700		1,700
NCE-Solar parks/ solar zones Upcoming Phase 2				1,400	1,400
Total	**550**	**2,366**	**1,700**	**1,400**	**6,016**

Table 89: Other solar initiatives by Telangana

Category	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
Solar Pumpsets (Nos)	20,000	20,000	20,000	20,000	80,000
Solar off grid systems – DDG (Nos)	73	146	146		365
Solar Roof Top Projects (MW)	10	50	120	140	320

8.3 State Government Intervention

Key interventions required from the State Government are listed below:

1. The State Government may expeditiously establish the proposed solar parks through expeditious land acquisition and obtaining all consents and clearances
2. Modalities for single window clearance may be finalized and single window clearance may be formally launched for faster clearance of NCE project proposals
3. Wind policy after due stakeholder consultation may be finalized and notified
4. Regulatory support for notification of feed in tariff for wind

8.4 GoI interventions

Financial assistance from the Central Government is requested for the following:

1. Viability gap funding for the proposed 3,100 MW of solar parks with a VGF of Rs 20 Lakhs per MW of capacity
2. Central Financial Assistance for 30% of cost of solar pumpset for 20,000 pumpsets per annum
3. Sanction of 320 MW of Solar roof-top projects for the period FY 15-16 to FY 18-19, with central financial assistance of 15% of the cost of the roof-top project from MNRE
4. Sanction of funds for implementing DDG for remote villages and hamlets through the DDUGJY scheme for TSSPDCL and also for TSNPDCL. A total of 365 households to be covered under this scheme over the next five years.

Table 90: Summary of GoI Interventions

All fig in Rs Crores	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
Solar Parks	-	-	340	280	620
Solar pumpsets for Agricultural services	300	300	300	300	1,200
Grid connected solar rooftop projects	120	120	120	120	480
Off-grid solar projects through DDG	1	3	3	-	7
Total GOI support for Renewable Energy	**421**	**423**	**763**	**700**	**2,307**

09. Energy Conservation And Energy Efficiency Program

9. Energy Conservation and Energy Efficiency Program

9.1 Demand Side Management in Agriculture in Telangana

The total energy consumption in Telangana State for agriculture is around 12,000 MU for FY 14 -15. The annual subsidy payout of the Government for FY 14-15 was Rs. 3,664 crores, given that the pricing for agriculture consumption is free.

Several studies and pilot projects in the country have indicated a minimum 25-30% reduction in agricultural consumption as a result of replacement of inefficient pumps of farmers with efficient ones.

As the farmers do not have any financial obligation to pay electricity bills, they have no incentive to invest in energy efficient pumps. Interventions that target subsidy reduction and which also provide incentive to farmers have succeeded in reducing consumption. The reduced maintenance cost of farmers is the biggest incentive in such cases.

EESL will invest the entire cost of Rs. 3,880[9] crores and provide energy efficient pumps to farmers free of cost. The savings as a result of the same are estimated to be 3,851 million KWh of the total annual consumption of these pumps. The resultant savings in subsidy will be Rs. 1,488 crores every year to State Government.

The project will also evolve standard operating processes as well as robust payment security mechanisms so as to replicate the same in an accelerated manner.

An independent mechanism for monitoring and verification of savings will be established.

A plan to cover the 19.4 Lakh pumpsets has been prepared which is below. The year wise investment required, savings to be achieved and reduction of subsidy burden is also indicated.

Note: Avg. rating of the pump is assumed as 5 HP. Power supply rate for agriculture is considered as Rs. 3.5/Unit with a CAGR of 2%

Table 91: Cost Savings and Investments for replacing agriculture pumpsets with solar pumpsets

Parameters	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
No. of pumps replaced	20,000	3,50,000	3,50,000	4,20,000	4,00,000	4,00,000
Expected reduction in Energy Consumption (MU per annum)	39	734	1,429	2,263	3,057	3,851
Annual Cost Savings (INR Crs)	13.8	262	520	840	1,158	1,488
Total Investments (INR Crs)	**40**	**700**	**700**	**840**	**800**	**800**

9.2 EESL's National Level LED Program

Hon'ble Prime Minister launched the 100 cities National Programme on 5th January, 2015 to convert all the conventional street lights with smart and energy efficient LED street lights and the Domestic Efficient Lighting Programme (DELP) to provide LED lights to domestic. EESL has been designated as the implementing agency for both the programs.

9.2.1 Promoting Efficient Lighting in Households in Telangana

Domestic Efficient Lighting Programme (DELP): The service model enables domestic households to procure LED lights at an affordable price of Rs. 10 each and the balance on easy instalment from their electricity bill. DELP is under implementation in AP, Delhi, Rajasthan, UP, Himachal Pradesh, Maharashtra. EESL is providing to consumers at a rate of Rs. 10 each as against their market price of Rs. 200-350. The average cost saving per LED for a domestic consumer is estimated between Rs. 160 – Rs. 400 (depending upon replacement of CFL or ordinary bulb) based on 4 hour use every day is more than the total cost of LED bulb. The total cost charged to consumers by EESL is Rs. 95-105 (based of applicable VAT/ Octroi in a state) and is less than the savings of 1 year. The bulb will function for at least 10-15 years and all savings after one year is of the consumer. The cost of LED bulbs and programme administration cost is recovered from consumers by deduction of easy instalments of Rs. 10 every month for 8-12 months from their electricity bills. The programme is delivering energy savings of 400 m kWh in Puducherry and AP as per the online monitoring system installed by EESL. So far more than 106 Lakh LED bulbs have been distributed in 22 cities across India.

9 Details as per EESL

- The total energy consumption of household in Telangana is around 9 billion KWh every year. Of this, lighting accounts for about 20% of consumption, which is around 1.8 billion KWh.
- As per the industry statistics, a large numbers of incandescent lamps are still used in households to serve the lighting needs. It is estimated that almost 1.9 crore incandescent lamps are sold annually in Telangana.
- Incandescent lamps are highly inefficient and 95% of electricity used by them is converted to heat. They can be replaced by LED lamps, which are 90% more energy efficient. A 7 W LED could replace 60 W incandescent lamp leading to an overall reduction of demand by 1,060 MW.
- Penetration of efficient lights in households is constrained by the first high cost barrier. The incandescent lamps are available at Rs. 10-15 while LED sell at Rs, 400-500 as a result the penetration of LEDs in household sector is less than 1%.
- EESL has developed and implemented a scheme where high quality LED lamps are given to households at the cost of incandescent lamps to encourage them to invest in energy efficiency. The large-scale replacement of incandescent lamps with LEDs leads to savings in peak power for DISCOMs. A part of the benefit of reduced peak demand is passed on to EESL to recover the investments made in the LED bulbs.
- An independent mechanism for monitoring and verification of savings will be established.
- A plan to cover the entire state having 1 crore households has been prepared which is below. The year wise investment required, savings to be achieved (assuming a variable cost of Rs.2.37/unit with a CAGR of 2%) and reduction of maintenance cost is also indicated[10].

Table 92: Cost Savings and Investments for replacing with LEDs in households

Parameters	FY 15-16	FY 16-17	FY 17-18	FY 18-19
No. of Households	20,00,000	30,00,000	30,00,000	20,00,000
No. of LED replaced	40,00,000	60,00,000	60,00,000	40,00,000
Annual Energy Saved (MU)	111	500	779	964
Annual Cost Savings to DISCOM (INR Crs)	26	121	192	242
Total Investment (INR Crs)	**40**	**60**	**60**	**40**

9.3 Demand Side Management in Municipal Street Lights in Telangana

Street Light National Programme (SLNP): EESL has evolved a service model to enable Municipalities to replace conventional lights with LEDs at no upfront cost. The balance cost is recovered through the municipalities by monetising the energy savings. EESL has implemented about 92,000 street light retrofit project in Vizag this project will reduce the energy consumption by 50%. The entire upfront capital of Rs. 64 crore has been invested by EESL and will be recovered over a 7 year period. The municipality will pay EESL a sum of Rs. 18.5 crore every year whereas its overall costs savings would be Rs. 31 crore annually. The actual energy saving achieved 50% in electricity bill of Greater Vizag Municipal Corporation (GVMC) during January to April this year as compared to same period last year. More than 2.3 Lakh LED Street Lights have been installed so far across India. Replacement work of conventional Street light with LED Street light is completed in 8 ULBs in Rajasthan, Tripura, AP & installation work is under progress in about 90 ULBs.

The total energy consumption in Telangana for street light is around 1001 million units every year. The annual energy bill and maintenance charges of the Urban Local Bodies (ULBs) is 309 crores and 363 crores respectively. Almost the entire public lighting is based on conventional lights and in most cases, the functional efficiencies as well as the light output is much lower than the prescribed standards.

EESL has been implementing street light energy efficiency retrofits in many states and have demonstrated energy savings between 50-55% by use of LED street lights. In addition to energy savings, LED street lights also reduce maintenance costs as they come with 5-7 years free replacement warranties, enhance the light output and meet national lighting standards, allow automatic controls to enhance savings by remote switching, daylight savings and dimming. In addition, LED lamps improve the power factor of the system and enhances the savings to DISCOMs.

EESL will invest the entire cost of Rs. 720 crores and provide energy efficient LED street lights at no upfront cost to ULBs. The savings as a result of the same are estimated to be 397 million units of the total consumption of these lights. The resultant savings in maintenance cost of estimated to be Rs. 254 crores. There will be no additional cost to ULBs and the EESL payments will be met out of savings in energy and maintenance costs.

An independent mechanism for monitoring and verification of savings will be established.

A plan to cover all ULBs in the state of Telangana has been prepared which is below. The year wise investment required, savings to be achieved and reduction of maintenance cost is also indicated[11].

10 Details as per EESL

11 Details as per EESL

Table 93: Cost Savings and Investments for replacing street light with LEDs

Parameters	FY 15-16	FY 15-16	FY 16-17	FY 17-18	FY 18-19
No. of Streetlights replaced	40,000	2,25,000	2,25,000	2,10,000	2,00,000
Expected reduction in Energy Consumption (MU per annum)	7.2	117	216	309	397
Annual Cost Savings to Municipalities (INR Crs.)	4.2	70	132	192	252
Total Investments (INR Crs.)	**32**	**180**	**180**	**168**	**160**

10. **Other initiatives**

10. Other initiatives

10.1 Communication

Successful implementation of 24X7 Power Supply Scheme requires clear communication among all the stakeholders across the value chain, including the consumers. In order to avoid potential roadblocks in implementation due to poor communication and flow of information, the following table lists the primary responsibility of each stakeholder and the corresponding method in which it will be carried out.

The financial position of the distribution utilities of Telangana makes it imperative to raise tariffs while other initiatives including 24X7 supply are implemented. Such tariff increases would inevitably impact consumers and meet with resistance. To address this, the utilities would clearly communicate their plans on implementing the reliable 24X7 supply scheme along with the other reliability and efficiency improvement measures that they are implementing. A high level of involvement of the Government of Telangana will also be required.

Table 94: Responsibility allocation and frequency of communication

Communication objective	Responsibility	Frequency
Power for All roll-out plan	Energy Secretary	Quarterly
Power Supply Position	CMD TRANSCO	Daily
Energy efficiency and conservation	CEO SECM	Monthly
Planned outages and disruption	CMD DISCOM	Daily
Real-time feeder-wise information	CMD DISCOM	Daily
Status update on deliverables	Energy Secretary	Quarterly
Renewable Power	CEO TNREDCL	Quarterly
Generation - projects, PLF and fuel	MD, TSGENCO	Monthly
Transmission - progress and achievements	CMD TRANSCO	Monthly
Distribution - progress, achievements, losses and other consumer initiatives	CMD DISCOM	Monthly

10.2 Information Technology (IT) Initiatives

The need to adopt IT in every sphere of utility operation is pervasive. Power is a complex product that must be consumed on a real time basis. The overall value involved in the process is very high. Even more importantly it touches all citizens. Yet, the information systems that drive the operations of the sector are generally very basic and information transparency and consistency is poor. While sporadic efforts have been made in the past to improve this, quantum changes are required to increase IT adoption in all spheres of power sector operation.

Some of the key IT initiatives under implementation as well already in action by the TSDISCOMS include:

1. Load monitoring system has been developed in-house for monitoring and scheduling load dispatch at 33 kV level
2. In-house developed Energy Billing System (EBS) has been implemented at 29 EROs. Centralized accounting is being carried out through this application. R-APDRP Metering, Billing and Collection (MBC) is implemented in 22 municipal towns
3. Major functional activities such as Project System, Plant Maintenance, Material management and Financial system are running on SAP modules
4. GIS interface has been developed for interface with SAP and R-APDRP systems to update GIS delta changes in R-APDRP towns
5. Powernet has been deployed for studying 33 kV and 11kV grid flows. Another in-house application has been developed for monitoring substation construction progress

10.3 Consumer-centric initiatives

The TSDISCOMS are committed to evolve from mere energy providers to a more comprehensive energy partners for industrial consumers and a reliable product/service providers to other consumers.

Accordingly the DISCOMS have taken up a wide array initiatives to improve consumer focus and enhance customer satisfaction. Key initiatives in this aspect are listed below:

1. NPDCL has launched RythuMitra to enable meeting citizen charter of ensuring replacing failed DTRs within 48 hours
2. In-house developed application is in place for monitoring of new agricultural connection applications and maintenance of seniority at division level
3. DISCOMS has successfully extended consumer services through Mee Seva. 12 services are offered on the Mee Seva platform
4. DISCOMS have extended online bill payment facility to consumers through internet bill desk.
5. Centralized customer care center has been established under R-APDRP at Corporate Office for registering and monitoring calls and other consumer related programs 24x7

10.4 Training and Capacity Building

With the increase of IT in the Generation, Transmission & Distribution system and to meet the expectations of 24 X 7 power supply for the consumers in the state, it is important to focus on capacity building of the employees for enhancement of technical know-how for latest technological developments and to increase the consumer satisfaction. The capacity building may also include consumer grievance system, awareness regarding importance of working with safety, outage management system, demand side management etc.

Table 95: The human resource base of the TSDISCOMS

Parameters	FY 15-16 (Nos.)	FY 16-17 (Nos.)	FY 17-18 (Nos.)	FY 18-19 (Nos.)	FY 18-19 (Nos.)
Technical staff					
Officers	456	465	474	484	494
Junior engineers	1312	1837	2572	3600	5040
Subordinates	5619	5844	6078	6321	6573
Total technical staff	**7387**	**8146**	**9124**	**10405**	**12107**
Non-technical staff					
Officers	446	453	459	466	473
Ministerial staff	1166	1183	1201	1219	1238
Others	981	986	991	996	1001
Total non-technical staff	**2593**	**2622**	**2651**	**2681**	**2712**

The DISCOMS have established two training institutes each for TSSPDCL and TSNPDCL for imparting training on various aspects related to distribution infrastructure management, safety and related aspects. For TSSPDCL. The DISCOMS have budgeted Rs 1.42 Crores for conducting training programs in the following areas:

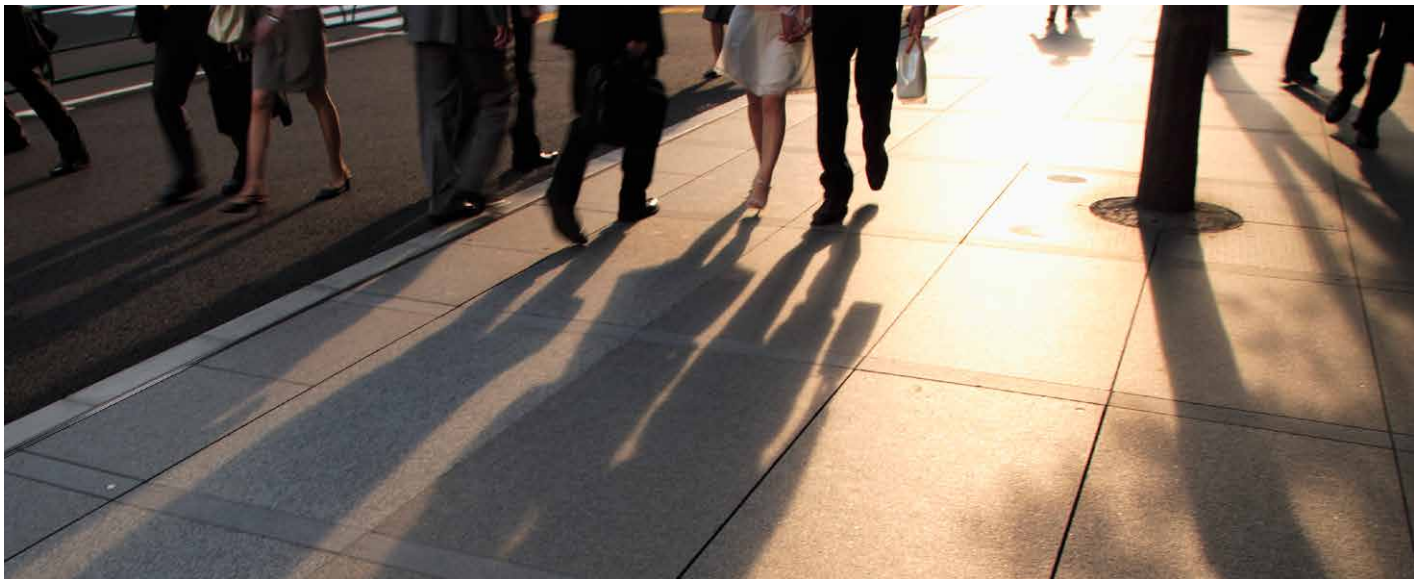


Table 96: Details of the training programs

S.No	Name of training	Number of programs in year
1	Induction Training Program for newly recruited Assistant Engineers	3
2	Refresher Training Program for Sub-Engineers	2
3	Induction/refresher Training Program for JLMs	40
4	Open Access Metering related Issues	5
5	Solar Net Metering	5
6	Awareness Program on construction Standards and Quality Control aspects	2
7	Awareness Program on Safety Aspects , First Aid, & Health Awareness	10
8	Training Program on Metering, Protection and Transformers	2
9	Preventive Maintenance of DTR's PTRs and Earthing Practices	6
10	Linemen training	30
11	Metering & Billing	6
12	Safety, accident prevention and Disaster Management	6
13	Operation & Maintenance of Distribution Transformers, Prevention of failures and repairs	6

10.5 Institutional arrangements

A strong monitoring framework is essential to ensure the success of the "Power for All" scheme. The following structure is being proposed to undertake regular monitoring of the progress of all initiatives being undertaken in this scheme.

- **Government of India (GOI) Level Committee:** It is proposed that this committee will review the overall progress of the scheme on a quarterly basis and provide necessary support to ensure a coordinated response from the Central Government - where necessary. The committee may be constituted with the following members – PFC, REC, CEA, SECI, EESL, BEE, Ministry of Power, MoEF and MNRE.
- **State Government Level Committee:** It is proposed that a State level committee headed by the Secretary (Power) will be formed to review the progress of the scheme on a quarterly basis. This committee will monitor the progress of the works undertaken as part of the scheme and issue directions to enable faster execution.
- **Department Level Committee:** It is proposed that a Department level committee headed by the Nodal Officer will be formed which shall undertake steps required to ensure the projects are progressing as per the action plan. This committee will undertake progress reviews on a monthly basis.
- **District Level Committee:** It is proposed to constitute a district level committee headed by the S.E. to take action that is necessary to ensure the projects are completed in a timely manner and address any issues pertaining to land or other relevant approvals.
- **Project Monitoring Unit (PMU):** A project monitoring unit shall be set up for monitoring the progress of the works being undertaken under this scheme. The PMU will operate under the Secretary, Energy and shall be operated by an external independent agency.

The PMU shall be responsible for undertaking coordination, preparing the action plans and monitoring progress of all works under the "Power for all" scheme. The PMU would also help facilitate in tracking the action steps and providing feedback to the various committee that are proposed to be set up under the scheme. Government of India shall provide grants for the PMU operations.

The committees that are being proposed above are required to be set up at the earliest to kick start the whole scheme. It is important that the committees keep meeting on a regular basis as per the frequency/ timelines mentioned above – to ensure that the objectives set out under the "Power for all" scheme are achieved.

11. **Roll Out Plan Summary**

11. Roll Out Plan Summary

11.1 Generation

Table 97: Generation Roll Out Plan

Generating Stations	Capacity MW	FY 15-16	FY 16-17	FY 17-18	FY 18-19
TS GENCO Thermal Stations					
Cash flow from operations					
Kakatiya Thermal Power Plant Stage II	600	600			
KTPS Stage VII	800			800	
Manuguru TPP	1,080		1,080		
Damarcherla TPP	4,000				4,000
TS GENCO Hydel Stations					
Lower Jurala HEP	240	240			
Pulichintala HEP	120	120			
Central Generating Stations (Contracted Capacity with TSDISCOMs)					
Tuticorin Unit 1	69	69			
Tuticorin Unit 2	69	69			
Kalpakkam	71	71			
Kundamkulam Unit 2 (NPCIL)	50	50			
Kudigi Unit 1	75		75		
Kudigi Unit 2	75		75		
Neyveli New TPP Unit 1	36			36	
Kudigi Unit 3	84			84	
Neyveli New TPP Unit 2	36				36
Kudigi Unit 4,5	168				168
NPTC UMPP	4,000				4,000
Other Generating Stations					
Singareni Stage 1	1,200	1,200			
Thermal Powertech	269	269			
Chattisggarh Power Plant	2,000		2,000		
DBFOO	750	750			
Singareni Stage 2	600				600
Total (in MW)	**16,392**	**3,483**	**3,230**	**920**	**8,804**

The above figures does not include solar capacity addition

11.2 Transmission

Table 98: Year wise roll out of the transmission network

Voltage Lev-el	Unit	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
400KV	No		3	6	4	4	17
	MVA		2,605	5,835	3,660	2,920	15,020
	Ckm.		337	853	2,600	518	4,308
220KV	No	3	11	11	7	3	35
	MVA	490	2,646	2,386	1,400	600	7,522
	Ckm.	22	629	979	280	80	1,990
132KV	No	8	31	24	13	16	92
	MVA	278	2,409	1,407	819	1,008	5,921
	Ckm.	127	931	915	309	226	2,508

Table 99: Summary of the capacity additions

Type	SS (Nos)	MVA	Ckt - Kms
400kV	17	15,020	4,308
220kV	35	7,522	1,990
132kV	92	5,921	2,508
Total	**144**	**28,463**	**8,806**

11.3 Distribution

11.3.1 Electrification Roll out Plan

Table 100: Year Wise Electrification roll out plan

Parameter	FY 15-16	FY 16-17	FY 17-18	FY 18-19
	TSNPDCL			
Connecting existing un-electrified rural households (Nos)	64,004	128,008	128,008	320,020
Connecting existing un-electrified urban households (Nos)	15,000	15,000	14,532	44,532
	TSSPDCL			
Connecting existing un-electrified rural households (Nos)	80,314	160,627	160,627	401,568
Total number of households electrified in the state	**159,318**	**303,635**	**303,167**	**766,120**

Table 101: District Wise Electrification Roll Out Plan

Districts (TSSPDCL)	FY 15-16 (Nos.)	FY 16-17 (Nos.)	FY 17-18 (Nos.)	Total (Nos.)
Mahabubnagar	31,910	63,821	63,821	159,552
Nalgonda	24,296	48,592	48,592	121,480
Medak	20,986	41,973	41,973	104,932
Ranga Reddy	3,121	6,242	6,242	15,604
Total	**80,314**	**160,627**	**160,627**	**401,568**
DDG Scheme	**74**	**146**	**146**	**365**
Districts (TSNPDCL)	**FY 15-16 (Nos.)**	**FY 16-17 (Nos.)**	**FY 17-18 (Nos.)**	**Total (Nos.)**
Warangal	15,382	30,762	30,762	76,906
Karimnagar	15,119	30,238	30,238	75,595
Khammam	10,086	20,171	20,171	50,428
Nizamabad	9,440	18,879	18,879	47,198
Adilabad	13,979	27,957	27,957	69,893
Total	**64,006**	**128,007**	**128,007**	**320,020**
Urban Households	**15,000**	**15,000**	**14,352**	**44,352**

11.3.2 Roll Out of AT&C Loss Reduction of TSSPDCL

Table 102: Year wise AT & C loss reduction plan for TSSPDCL in %

Circle	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Mahabubnagar	11.92	11.42	10.92	10.42	9.92
Nalgonda	11.25	10.75	10.25	9.75	9.25
Medak	9.24	8.74	8.24	7.74	7.24
RR East	8.70	8.20	7.70	7.20	6.70
Ranga Reddy-North	3.77	3.70	3.60	3.50	3.46
Ranga Reddy-South	10.60	10.10	9.60	9.10	8.60
Hyderabad-North	4.85	4.75	4.25	3.75	3.25
Hyderabad-South	45.19	44.19	43.19	42.19	41.69
Hyderabad-Central	10.47	9.97	9.47	8.97	8.47
Ranga Reddy Total	7.51	7.01	6.51	6.01	5.51
Hyderabad Total	17.53	17.03	16.53	16.03	15.53
TSSPDCL	**12.51**	**11.83**	**11.65**	**10.87**	**10.48**

11.3.3 Roll Out of AT&C Loss Reduction of TSNPDCL

Table 103: Year wise AT & C loss reduction plan for TSNPDCL in %.

Circle	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Warangal	13.74	13.18	12.88	12.58	12.30
Karimnagar	11.64	11.58	11.28	10.98	10.70
Khammam	12.25	12.09	11.79	11.49	11.21
Nizamabad	16.89	16.06	15.76	15.46	15.18
Adilabad	11.77	10.86	10.56	10.26	9.98
TSNPDCL	**13.32**	**12.88**	**12.58**	**12.28**	**12.00**

11.3.4 Roll Out for infrastructure addition

Table 104: Distribution Roll Out Plan – Capacity Additions

Summary of infrastructure additions - TSDISCOMs							
Category	**Units**	**FY 14-15**	**FY 15-16**	**FY 16-17**	**FY 17-18**	**FY 18-19**	**Total**
33/11kV SS unit additions	Nos	73	254	231	175	202	**937**
Capacity	MVA	621	2,162	1,966	1,490	1,720	**7,959**
Feeder Additions	Km	10,934	38,866	40,630	33,916	30,773	**155,119**

11.4 Non-conventional sources of energy

Table 105: Year wise capacity addition planned

Generating Stations	Capacity MW	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Renewable Energy Sources					
Solar Competitive Bidding – Phase 1	550	550			
Solar Competitive Bidding – Phase 2	2,366		2,366		
Solar Parks/ Solar Zones – Phase 1	1,700			1,700	
Solar Parks/ Solar Zones – Phase 2	1,400				1,400

Table 106: Roll out plan for solar pumpsets and root top programs

Category	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
Renewable Energy Sources					
Solar Pumpsets (Nos)	20,000	20,000	20,000	20,000	80,000
Solar off grid systems – DDG (Nos)	73	146	146		365
Solar Roof Top Projects (MW)	10	50	120	140	320

11.5 Energy Efficiency and conservation

Parameters	FY 15-16	FY 16-17	FY 17-18	FY 18-19
No. of pumps replaced	20,000	3,50,000	3,50,000	4,20,000
No. of LED replaced	40,00,000	60,00,000	60,00,000	40,00,000
No. of Streetlights replaced	40,000	2,25,000	2,25,000	2,10,000

As furnished by EESL

12. Annexure 1 – Generation (Existing State Generating Stations)

12. Annexure 1 – Generation (Existing State Generating Stations)

Generating Station	Installed Capacity (MW)	TS Share Capacity (MW)
TSGENCO Thermal Stations		
Kothagudem Thermal Power Stations (A, B, C, D, Stage VI)	1,720	927
RTS B	63	34
Kakatiya Thermal Power Plant	500	269
Total	**2,283**	**1,230**
TSGENCO Hydel Stations		
Nagarjuna Sagar Power House	816	440
NSLCPH	60	32
Pochampad PH	36	19
Nizam Sagar PH	10	5
Singur	15	8
SSLM LCPH	900	485
Priyadarshini Jurala HEP AP Share	234	126
Mini Hydel and others	12	7
Total	**2,083**	**1,122**
APGENCO Thermal Stations		
VTPS (I, II, III, IV)	1,760	948
RTPP Stage I,II,II	1,050	566
Total	**2,810**	**1,514**
APGENCO Hydel Stations		
MACHKUND PH AP Share	84	45
TUNGBHADRA PH AP Share	58	31
USL	240	129
LSR	460	248
DONKARAYI	25	13
SSLM	770	415
NSRCPH	90	49
PABM	20	11
Total	**1,747**	**941**
Grand Total	**8,923**	**4,807**

13. **Annexure – 2**
Transmission

13. Annexure - 2 Transmission

13.1 400 kV List of Substations and their capacities - Planned

Sl. No.	Name of SS	District	Capacity in MVA	Total MVA	COD
1	400/220/132kV Narsapur	Medak	3x315 + 2x100	1,145	Dec-2016
2	400kV Nirmal, Adilabad	Adilabad	3x315	945	Sept-2017
3	400kV Dindi	Mahaboobnagar	2 x 315	730	June-2016
4	400/220kV Julurupadu SS	Khammam	2 x 315	730	Mar-2017
5	400/220kV Jangaon SS.	Warangal	2 x 500	1,000	Dec-2017
6	400/220kV Maheshwaram	Ranga Reddy	2 x 500	1,000	Dec-2017
7	400/220kV Manikonda	Ranga Reddy	2 x 315	730	Dec-2017
8	400kV SS at Myadaram	Karimnagar	6x 180	1,080	Mar-2018
9	400kV SS at choppadandi	Karimnagar	4 x 180	720	Dec-2018
10	400kV SS at Ramadugu	Karimnagar	6 x 180	1,080	Mar-2018
11	400kV SS at Tippapur	Karimnagar	4 x 180	720	Dec-2018
12	400kV SS at Chinnakodur	Medak	4 x 180	720	Dec-2018
13	400kV SS at Kolhapur (Stage-I)	Mahaboobnagar	2 x 315	730	Dec-2019
14	400kV SS at Kodair (Stage-II)	Mahaboobnagar	2 x 315	730	Dec-2019
15	400kV SS at Bijenepally (Stage-III)	Mahaboobnagar	2 x 315	730	Dec-2019
16	400kV SS at Nawabet (Stage-IV)	Mahaboobnagar	2 x 315	730	Dec-2019
17	400kV SS at Choutuppal	Nalgonda	3 x 500	1,500	Mar-2019
	Total			**15,020**	

13.2 400 kV List on transmission lines – Planned

Sl. No.	Name of Line	Length in CKM	COD
I	**Narsapur Scheme**		
i)	LILO of 400kV Yeddumailaram-Gajwel DC line to 400/220/132kV Narsa-pur SS	10	Dec'2016
	Scheme TOTAL	**10**	
II	**Suryapet Transmission Scheme**		
	LILO of VTS-Malkaram DC line Ckt-I to 400/220/132kV Suryapet SS	12	Dec'2015
	Scheme TOTAL	**12**	
III	**Jaipur Power Evacuation scheme**		
i	400kV Quad DC Line from Jaipur TPP (SCCL) to Rangampet and Rangam-pet to Gajwel	325	2015-16
ii	400kV DC Line from Jaipur (SCCL) proposed Nirmal Sub-Station	284	Dec'2016
	Scheme TOTAL	**609**	
IV	**Hyderabad-Wardha Transmission Link Scheme**		
1	400kV Quad LILO line to Manikonda SS from Suryapet -Shankarapally to Manikonda SS	40	Dec'2017
2	400kV DC line from 765kV Maheswaram SS (PGCIL) to Maheswaram 400/220kV SS	---	Dec'2017
3	400kV DC line from 765kV Maheswaram SS to Shankarpally SS	15	Dec'2017
	Scheme TOTAL	**55**	
V	**Dr. B.R. Ambedkar Pranahitha Chevella Sujala Shravanthi LI Scheme**		
1	Erection of 400kV SS at Ramadugu along with connected lines (pkg-8)	400	Mar'2018
2	Erection of 400kV SS at Choppadandi along with connected lines (pkg-7)	50	Dec'2018
3	Erection of 400kV SS at Myadaram along with connected lines (pkg-6)	50	Mar'2018
4	Erection of 400kV SS at Tippapur along with connected lines (pkg-10)	240	Dec'2018
5	Erection of 400kV SS at Chinnakodur along with connected lines (pkg-11)	200	Dec'2018
	Scheme TOTAL	**940**	
VI	**Power Evacuation of Palamoor - Ranga Reddy Lift Irrigation Scheme**		
1	400kV Quad Moose DC line from proposed Kolhapur SS to proposed Ko-dair SS	156	Dec'2019
2	400kV Quad Moose DC line from proposed Kodair SS to Veltoor SS	108	Dec'2019
3	400kV Quad Moose DC line from proposed Kodair SS to proposed Bijenep-ally SS	84	Dec'2019
4	400kV Quad Moose DC line from proposed Bijenepally SS to proposed Na-wabpet SS	90	Dec'2019
5	400kV Quad Moose DC line from Nawabpet SS to proposed Maheswaram SS		Dec'2019
	Scheme TOTAL	**438**	
VII	**Power Evacuation of Construction of new units of 4x270MW at Bhadra-dri Thermal Power Station Manugur and 1 x 800MW KTPS (Stage - VII).**		
1	400kV Quad DC line from Bhadradri Thermal Power Station Manugur to proposed Julurupadu 400kV SS.	220	Mar'2017
	400kV Quad DC line from Julurpadu to 400kV Khamma SS	80	Mar-2019
2	400kV Quad DC line from KTPS (Stage -VII) to proposed 400/220kV Julu-rupadu SS	70	Mar'2017
3	400kV Quad DC line from proposed 400/220kV Julurupadu SS - Suryapet 400kV SS	214	Dec'2017
4	400kV Quad DC line from 400kV Julurupadu SS to proposed Jangaon 400/220kV SS	400	Dec'2018
5	400kV Quad DC line from proposed Jangaon 400/220kV SS - proposed Tippapur SS	140	Dec'2018
	Scheme TOTAL	**1124**	

Sl. No.	Name of Line	Length in CKM	COD
VIII	**Power Evacuation scheme of Generating Stations at Damaracherla, Nalgonda(District)**		
1	400kV Quad Moose DC line from proposed Kolhapur SS to proposed Ko-dair SS	310	Dec'2018
2	400kV Quad Moose DC line from proposed Kodair SS to Veltoor SS	310	Dec'2018
3	400kV Quad Moose DC line from proposed Kodair SS to proposed Bijenep-ally SS	210	Dec'2018
4	400kV Quad Moose DC line from proposed Bijenepally SS to proposed Na-wabpet SS	140	Dec'2018
5	400kV Quad Moose DC line from Nawabpet SS to proposed Maheswaram SS	150	Dec'2018
	Scheme TOTAL	**1120**	
	Grand TOTAL (in CKM)	**4308**	

13.3 220/132 kV Transmission Infrastructure Details

13.3.1 Infrastructure Additions in FY 2014-15 – Substation and capacity

Sl. No.	Voltage	Substations	No of SS	MVA
1	132	132/33 KV Substation, Thallada (1x10/16+1x31.50)=47.50MVA	1	47.5
2	132	2nd PTR 10/16 MVA at 132/33 KV Substation, Jadcherla	-	16.00
3	132	132/33 KVSS at Karimnagar Waterworks (Town) with 1x31.5 MVA PTR capacity	1	31.50
4	132	132/11 KV Gudem Substation Adilabad District	1	25.00
5	132	132/33 KVSS at Palamakula with 2x10/16 MVA	2	47.50
		33kV features at 220kV SS Boothpur in Mahaboobnagar dist	-	16.00
6	132	132kV SS Ghanapur in Mahaboobnagar dist with 1x31.5MVA PTR capacity	1	31.50
7	132	132kV SS Kosigi in Mahaboobnagar dist with 1x31.5MVA PTR capacity	1	31.50
8	132	132 KV Guntipally SS in Nalgonda dist 2nd PTR of capacity31.5MVA charged Originally charged with 1x16 MVA sanctioned 1x16+1x31.5MVA	1	31.5
		TOTAL	**8**	**278**
1	220	2nd 100 MVA PTR at 220KV Sadashivpet Substation enhanced from 1x100 MVA to 2 x 100 MVA	-	100
2	220	220 KV Miyapur SS in Ranga Reddy Dist. With 1 X 160 MVA Transformer	1	160
3	220	220 KV Fabcity SS with 1 x 100 MVA+ 1 x50 MVA Transformer in Ranga Reddy Dist.	1	150
4	220	220/132/33kV SS Miyapur (originally charged with 1x160MVA on 8.12.2014)	1	80
		TOTAL	**3**	**490**
		Grand Total	**11**	**768**

13.3.2 Infrastructure Additions in FY 2014-15 – Transmission Lines

Sl. No.	Voltage	Transmission Lines	Ckt - KMs
1	220	220 KV LILO Budidampad - Bhongiri to 220 KVSS, Waddekothapally	14.00
2	220	220 KV line with XLPE UG cable for LILO of 1st circuit of Shapurnagar -Gachibowlly DC line to proposed 220/132/33kV Miyapur SS in Ranga Reddy dist	1.97
3	220	220 KV DC line from 400 KV Mamidipally to 220 KV Fab City SS in Ranga Reddy dist	6.00
4	132	132 kV LILO line to 132 kV SS Alampur from 132 kV Gadwal – AP Carbides feeder in Mahaboobnagar district	1
5	132	132 KV DC line for LILO of existing 132 KV Gajwel- Chegunta 2nd circuit to 400/220,132KV Gajwel Substation.	32.40
6	132	132 KV DC line for LILO of existing 132 KV Budidampad- Penubally 2nd ckt to Tallada.	8.20
7	132	132 KV DC/SC line from 132 KV Luxettipeta SS 132/11 KV Gudem SS	11.851
8	132	132 KV DC/SC line from 220/132 KVSS Durshed to 132/33KV SS Karimnagar Water Works (Town)	6.30
9	132	132 KV 2nd circuit from 220/132 KVSS Bheemgal to 132/33 KVSS Sirikonda in Nizamabad Dist.	16.10
10	132	2nd ckt stringing from exesting 132 KV Kodangal - Maddur DC/SC line to the tapping point near Kosagi SS.	17.30
11	132	132 KV DC/SC line from tapping point near Kosagi SS to 132 KV Kosagi SS	0.03
12	132	132 KV DC/SC line from Husnabad to Palamakula	26.00
13	132	132 KV LILO from 132 Kv Boothpur -Kothakota LIS to the proposed 132/33 KV Ghanapur SS in Mahaboobnagar dist	8.00
		TOTAL	**149**

13.3.3 Proposed Infrastructure Additions in FY 2015-16 – SS and Transmission Lines

Sl. No	District	Voltage	Name of the Transmission Line/SS	PTR Capacity	Line (CKM)
1	Adilabad	132kV	132/33 kV Substation at Utnoor(2x16MVA) (ii) 132kV DC/SC line from Ichoda 132 kV SS to the proposed 132/33 kV Utnoor SS	2x16	38.33
2	Adilabad	132kV	Erection of 132 kV DC line from 220 kV Mandamarri (Bellampalli) substation to **M/s Singareni Colieries Co. Ltd. (start up power to jaipur plant)**	-	57.69
			TOTAL		**96.02**
3	RangaReddy	220kV	a)220/132/33KV substation at Adibatla (Bonguloor) (2X100MVA & 2X50MVA) (ii)220 kV LILO from 220KV Dindi - Chandrayanagutta DC line to 220 kV Bongluru.	1x100 charged 1x100+ 2x50 are planned to be charged	2.00
			TOTAL		**2.00**

Sl. No	District	Voltage	Name of the Transmission Line/SS	PTR Capacity	Line (KM)
1	Adilabad	132kV	132/33 kV Substation at Khanapur	1x16 MVA	42.00
	Adilabad	132kV	132 kv DC/SC Line to proposed 132kv Khanapur SS from 220kv Nirmal SS.		
2	Adilabad	132kV	132/33 kV Substation at Asifabad	2 x 16 MVA.	29.08
	Adilabad	132kV	132kV DC/SC line from Sirpur-kagaznagar 132/33 kV SS to the proposed 132/33 kV Asifabad SS		
3	Adilabad	132kV	132/33 kV Substation at Burugupally	2 x 16 MVA.	34.8
	Adilabad	132kV	132 kV DC/SC line from Pochampadu- Nirmal line to the proposed 132/33 kV Burugupally SS by making Solid tapping		
4	Adilabad	132kV	132kV interlinking line to 220/132kV Mandamarri from 132kV Luxettipeta- Bellampally DC line in Adilabad	-	3.06
5	Warangal	132kV	132/33 kV Substation at Gudur	1x31.5 +1x16MVA	10.00
	Warangal	132kV	132kV LILO line from 132kV Narasampet - Ayyagarpalli to the proposed 132/33 kV Gudur SS.		

Sl. No	District	Voltage	Name of the Transmission Line/SS	PTR Capacity	Line (KM)
6	Warangal	132kV	132/33 kV Substation at Dornakal	1x31.5+1x16 MVA	20.00
	Warangal	132kV	132kV DC/SC line from 132/33kV Ayyagaripally SS to the proposed 132/33kV Dornakal SS		
7	Warangal	132kV	132/33 kV Substation at Narmetta	1x 31.5 + 1 x 16 MVA	17.50
	Warangal	132kV	132kV DC/SC line from Janagoan SS to the proposed 132/33 kV Narmetta SS.		
8	Nizamabad	132kV	132/33 kV Substation at Dasnagar	1x50+1x31.5MVA	20.00
	Nizamabad	132kV	132kV LILO line from 132kV Dichpalli-Nizamabad circuit-II to the proposed 132/33kV Dasnagar SS		
9	Karimnagar	132kV	132/33 kV Substation at Chippapalli	1x31.5 + 1x16 MVA	32.08
	Karimnagar	132kV	132kV DC/SC line from Kamareddy 220/132kV SS to the proposed 132/33 kV Chippalapally SS.		
10	Karimnagar	132kV	132KV Switching station, 33/132KV Power Transformer bay at NTPC Ramagundam switchyard.	1x10/16 MVA	1.40
	Karimnagar	132kV	132KV LILO Line from RTS-B – Kalwa Srirampur line to the proposed 132KV Switching station at NTPC Ramgundam Switchyard for evacuation of Solar power		
11	Karimnagar	132kV	132/33 kV Substation at Raikal	1x31.5+1x16 MVA	9.75
	Karimnagar	132kV	132 kV DC/SC line from Jagital 220/132 kV SS to the proposed 132/33 kV Raikal SS.		
12	Karimnagar	132kV	132kV DC/SC line from 132/33kV Dharmapuri SS to 132kV Luxxettipet SS	NA	22.41
13	Karimnagar	132kV	132/33 kV Substation at Kamanpur	2x16 MVA	
	Karimnagar	132kV	i) 132kV DC/SC line with multi circuit towers from Manthani 220 kV SS up to (AP 10) to accommodate both 132kV DC/SC line to kamanpur SS & 132 kV LILO line from 132kV RSS - Kamalapur line (Stringing one circuit) (9.5KM) ii) Erection of 132kV DC/SC line (normal towers) from Loc No.AP 10 to proposed 132 kV Kamanpur SS (13.9 KM)		23.40
	Karimnagar	132kV	iii) Stringing of two circuits on the already proposed multi circuit towers from the proposed 220 kV SS, Manthani to the proposed 132kV SS, Kamanpur (9.5 KM) iv) Erection of 132 k DC line from Location No. AP-10 of 132kV Kamanpur line to the tap point of 132 kv RSS- Kaamalapur DC line (0.5 KM)		20.00
14	Karimnagar	132kV	132/33 kV Substation at Kathlapur	2x16 MVA	15.00
	Karimnagar	132kV	132kV DC/SC line from Korutla 132kV SS to the proposed 132/33 kV Kathalapur SS.		
15	Karimnagar		132 kV LILO to 132 kV Chelpur SS from 132 kV RSS-OCM feeder DC line		6
16	Karimnagar		132kV DC line on Multi circuit towers for making LILO of 132kV Manthani-Kataram Line to 220/132kV Substation Manthani		5
17	Mahaboobnagar	132kV	132 KV Amarachinta SS	1x31.5+1x16	20.00
			132 KV DC/SC line from proposed 220/132 KV Jurala Substation to the proposed 132/33 KV Amarachinta SS(10.775 KM)		
18	Mahaboobnagar	132kV	132 KV LILO to Jurala 220 KV SS from Gadwal - Makthal (8.85 KM) (2nd Ckt)	-	17.70
19	Mahaboobnagar	132kV	132/33KV Alwal (Kesampet) SS.	1 x31.5 + 1 x 16 MVA	26.00
			132 KV DC/SC line from Amangal 132 KV SS to the proposed 132/33KV Alwal (Kesampet) SS.		
20	Mahaboobnagar	132kV	32/33 KV Srirangapur (Mogiligidda) SS	1 x 50 + 1 x31.5	14.00
			132 KV DC/SC line from 220/132/33 KV Shadnagar SS to the proposed 132/33 KV Srirangapur (Mogiligidda) SS		

Sl. No	District	Voltage	Name of the Transmission Line/SS	PTR Capacity	Line (KM)
21	Medak	132kV	132KV SS Borapatla	1 x31.5 + 1 x 16 MVA	36.00
			132 KV LILO line from existing 132 KV Minpur- Gummadidala.(18KM)		
22	Medak	132kV	132/33 KV Doulthbad SS	1 x31.5 + 1 x 16 MVA	32.70
			132KV DC/SC line from 400KV Gajwel SS to the proposed 132/33 KV Doulthbad SS (24 KM)		
23	Mahaboobnagar	132kV	132 KV SS at Madugula	2x31.5	39.40
		132kV	2nd Circuit Stringing on 132 KV Kalwakurthy-Amangal DC/SC Line.(19.4KM)		
		132kV	132 KV DC/SC Line from 132 KV Amangal SS to the proposed 132/33 KV Madugula SS.		
24	Mahaboobnagar	132kV	132/33 KV Ganganpalli (Alwalpad) SS(	1 x31.5 + 1 x 16 MVA	14.00
		132kV	132 KV DC/SC line from proposed 220/132 KV Jurala Substation to the proposed 132/33 KV Ganganpalli (Alwalpad) SS(14KM)		
25	Nalgonda	132kV	132/33 KV SS Yerraballi	1 x31.5 + 1 x 16 MVA	25.00
			Erection of 2nd ckt 132 KV Miryalaguda -Madugulapally/DC/SC upto loc.no.67.(22 KM)		
			132 KV DC/SC line from loc.no.67 of 132 KV Miryalaguda -Madugulapally/ DC/SC line to the proposed 132/33 KV Yerrabelli SS(3 KM)		
26	Medak	132kV	132/33 KV Yeldurthy SS	2x31.5	15.00
		132kV	132KV DC/SC line from chegunta 132KV substation to the proposed 132/33 KV Yeldurthy SS (17.3KM)		
27	Nalgonda	132kV	132 KV DC/SC line from Yeddumailaram to Pashamailaram(7 KM)	-	7.00
28	Nalgonda	132kV	132KV DC line from proposed 400/220/132 KV Suryapet SS to 132 KV existing Suryapet SS(7 KM)	-	14
29	Nalgonda	132kV	132KV DC/SC line from proposed 400/220/132 KV Suryapet SS to 132 KV existing Shaligowraram SS(35 KM)	-	34
30	Nalgonda	132kV	132KV DC/SC line from proposed 400/220/132 KV Suryapet SS to 132KV existing Thungathurthy SS. (30 KM)	-	30
31	Nalgonda	220kV	Erection of 132KV DC line from 132/33 KV SS Mattampally to proposed 220KV Huzurnagar SS(15 KM)		30.00
32	Nalgonda	220kV	Erection of 132KV DC line from 132/33 KV SS Vepalasingharam to proposed 220KV Huzurnagar SS(10 KM)		20.00
33	Mahaboobnagar	132kV	132/33 KV features at 220 KV Switching Station Dindi	2x100+ 2x31.5	67.00
		132kV	132 KV DC/SC line from 220 KV Dindi SS to 132/33 KV SS Achampet(27 KM) (2x100+2x31.5 MVA)		
		132kV	132 KV DC/SC line from 132 KV Achampet SS to 132/33 KV SS Nagarkurnool (40 KM)		
34	Nalgonda	132kV	132/33KV Munugodu SS	1 x31.5 + 1 x 16 MVA	25.00
		132kV	Erection of 2nd Ckt on 132 KV Nalgonda-Miryalaguda DC/SC line to proposed Munugodu		
		132kV	132 KV DC/SC line from 3 KM of 2nd Ckt on 132 KV Nalgonda-Miryalaguda DC/SC line to proposed 132/33 KV Munugodu SS (25 KM)		
35	Hyderabad	132kV	132/33KV GIS Balkampet SS.	2x80	4.00
			132KV XLPE UG SC Cable from 132KV Erragadda SS to the proposed 132KV GIS SS at Balkampet.		
36	Hyderabad	132kV	132KV XLPE UG SC Cable from proposed 132KV Balkampet GIS SS to proposed 132KV Patigadda GIS SS.		4.956
37	Hyderabad	132kV	132KV XLPE UG SC Cable from 132/33KV GIS Patigadda to 132KV Hussainsagar GIS SS.		5.663
38	Hyderabad	132kV	132KV SC UG Cable from 220/ 132KV GIS SS OU to 132KV GIS SS Chilkalguda.		4.200

Sl. No	District	Voltage	Name of the Transmission Line/SS	PTR Capacity	Line (KM)
39	Hyderabad	132kV	132/33KV GIS Moosarambagh SS. (2X80MVA)	2x80	0.95
			LILO of 132KV Ghanapur - Imlibun line with XLPE UG Cable to Moosarambagh GIS		
40	Hyderabad	132kV	132/33KV GIS Patigadda SS. (2X80MVA)	2x80	12.00
	Hyderabad	132kV	132KV XLPE UG DC cable from Gunrock to Patigadda.		
41	Hyderabad	132kV	132/33KV GIS Fever Hospital SS. (2X80MVA)	2x80	10.00
	Hyderabad	132kV	132KV XLPE UG DC cable from OU to Fever Hospital.		
42	Hyderabad	132kV	132/33KV NIMS GIS SS (2X80MVA)	2x80	13.00
	Hyderabad	132kV	132KV UG DC cable from 220KV Erragadda to NIMS		
43	Hyderabad	132kV	132/33KV GIS SS Narayanguda. (1X31.5 and 1 X16 MVA)	1x31.5+1x16	1.80
	Hyderabad	132kV	132KV XLPE UG SC cable from Fever Hospital. To Narayanaguda.		
44	Ranga Reddy	132kV	(a) 132 /33 kv SS at LGM Pet(V), (1X31.5MVA & 1X16MVA) Shameerpet (M),	1X31.5MVA & 1X16MVA	
		132kV	(b)132 kV Line from 400 kV Malkaram SS to the proposed 132 kV LGM Pet SS.		17
		132kV	132 kV XLPE UG cable from 400/220/132 Kv SS Malkaram to AP1 of the line proposed to the 132 KV SS LGM Pet		1.77
			TOTAL		**834.85**
1	Mahaboobnagar	220kV	220 KV DC line from 220/132 KV SS at Upper Jurala Lower jurala hydro electric project (11KM)		22.00
2	Mahaboobnagar	220kV	220 KV switching station at Thimmajipet	-	47.00
			220 KV DC(Twin moose) line from 400 KV Veltoor substation to the proposed 220 KV switching station at Thimmajipet		
			220 KV LILO line from 220 KVBoothpur-Kalwakurthy circuit 1 to the proposed 220 KV switching station at Thimmajipet		
			220 KV LILO line from 220 KVBoothpur-Kalwakurthy circuit 2 to the proposed 220 KV switching station at Thimmajipet		
3	Nalgonda	220kV	220 KV DC line from Pulichintala Hydro Electric Station switch yard to 220/132KV Huzurnagar SS (38 KM)	-	76.00
4	Mahaboobnagar	220kV	220/33 KV Singotam X Roads substation	2x20MVA	14.00
			220 KV LILO from 220 KV Wanaparthy-Ragimanagadda line to proposed 220/33 KV SS Singotam X Roads SS		
5	Nalgonda	220kV	220/132/33 KV Huzurnagar SS	2x100+2x31.5	
	Nalgonda	220kV	Erection of 220 kV DC line for LILO of one of the circuits Chilakallu - Narketpally DC Line to the proposed Huzurnagar SS		50.00
6	Nalgonda	220kV	LILO of one circuit of Chilakallu- Narkatpally DC line to the proposed 400/220/132 KV Suryapet SS (21 KM)		42
7	Nalgonda	220kV	220 KV DC Moose line to make LILO of (cktI&II) of 220 KV Miryalaguda-Khammam at the proposed 400/220/132 KV Suryapet SS(30 KM)		60
8	Hyderabad	220kV	220/132KV Imlibun GIS SS (2X160 MVA)	2x160	19.00
		220kV	220 KV XLPE UG DC Cable from 220KV Chandrayanagutta SS to the proposed 220KV GIS SS Imlibun.		

Sl. No	District	Voltage	Name of the Transmission Line/SS	PTR Capacity	Line (KM)
9	Ranga Reddy	220kV	220/33KV Hayathnagar substation. (2X50MVA)	2x50	
		220kV	220KV Multi Circuit line from 220KV Ghanapur SS to proposed 220/33KV Hayathnagar SS up to terminal tower at Marripally		36
		220kV	220KV UG DC cable from Marripally (Common point) near Nagole to proposed 220/33KV Hayathnagar SS.		14.44
10	Ranga Reddy	220kV	220KV SS at Nagole, (2X100MVA & 2X31.5MVA)	2X100MVA & 2X31.5MVA	3.40
		220kV	220 KV DC UG Cable from Terminal Tower at Nagole to the proposed 220/132/33kV SS Uppal (HMRL)		
11	Ranga Reddy	220kV	(i) 220/132KV SS at Parigi (2X100MVA) and connected (ii) DC Line from Parigi up to AP 12	2x100	46.00
12	Ranga Reddy	220kV	Erection of (a) 220 kV DC line from 132 kV Mamidipally SS upto Loc.No.12 of 220 kV line to the proposed 220 kV Fabcity SS from 400 kV Mamidipally SS with Narrow Based Towers (b) 220 kv 2nd ckt stringing (3rd and 4 th ckt) fromLoc.No.12 on the Narrow based Multi Circuit towersupto 220 kv Fabcity SS	-	6.00
13	Ranga Reddy	220kV	Erection of 2nd circuit from220 kV Shivarampalli SS to 132 kV Asifnagar SS by laying 220 kv XLPE cable (3 Km) , 132 kV Bay extension at 220 kv Shivrampalli SS and 1 No. 132 kv Bay at 132 kv Asifnagar SS	-	3.00
14	Ranga Reddy	220kV	220/132 KV GIS SS at Osmania University (Chilkalguda) (2X160 & 2X80 MVA) (ii)220 KV XLPE DC UG Cable from Moulali 220 KV SS to the 220 KV GIS SS at Osmania University.	2X160 & 2X80 MVA	17.93
15	Ranga Reddy	220kV	220KV XLPE under ground cable for LILO of 220KV Ghanapur- Malkaram DC line to 220KV Moulali SS(One circuit)	-	17.69
16	Ranga Reddy	220kV	220KV DC Line from 400KV Shankerpally to AP 12 for 220KV Parigi SS & 220 kV Bay extensions at 400/220 kV Yeddumailaram SS		30.00
17	Karimnagar	220kV	220/132kV Substation at Manthani	2x100	
	Karimnagar		220 kV LILO to proposed 220kv Manthani SS from 220 kV RSS – Warangal DC line		50
	Karimnagar		Stringing of two circuits on the already proposed multi-circuit towers from the proposed 220 kV SS, Manthani to Location No. AP 10 of 132kV Line from proposed 220kV SS, Manthani to the proposed 132kV SS, Kamanpur		30
	Karimnagar		132 kV LILO to 132 kV Chelpur SS from 132 kV RSS-OCM feeder DC line		6
	Karimnagar		132kV DC line on Multi circuit towers for making LILO of 132kV Manthani-Kataram Line to 220/132kV Substation Manthani		5
			Grand Total	**5,055**	**1,560**

13.3.4 Proposed Infrastructure Additions in FY 2016-17 – SS and Transmission Lines

Sl. No	District	Voltage	Name of the Transmission Line (KV)	MVA	Line CKM
1	Karimnagar	132kV	132/33 kV Substation at Kachapur	47.50	
	Karimnagar	132kV	132 kV DC/SC line from proposed 220/132 kV Huzurabad LIS substation to the proposed 132/33 kV Kachapur SS.		18.00
2	Karimnagar	132kV	providing second source of supply to 132/33 kV Sub-Station, Dharmapur in Karimnagar District by stringing of 132kV 2nd circuit on existing 132kV DC/SC line from 220/132 kV SS Jagityal to 132/33 kV SS Dharmapuri		23.00
3	Karimnagar	132kV	Erection of 132 kV line with four circuits on Galvanised Multi-Circuit towers with Panther ACSR for making LILO of both 132kV Husnabad – Huzurabad & 132kV Mulkanoor – Huzurabad circuits at 220/132kV new Huzurabad LISS	100.00	31.00
4	Karimnagar	132kV	132/33 kV Substation at Jangapally, Bejjanki(M)	48.00	
		132kV	132 kV DC line on Galvanised Towers with Panther ACSR for making LILO of 132 kV Durshed to Shanigaram line to the proposed 132/33 kV Sub-Station, Jangapally		28.00

Sl. No	District	Voltage	Name of the Transmission Line/SS	PTR Capacity	Line (KM)
5	Khammam	132kV	132/33 kV Substation at N.V.Puram	32.00	
		132kV	132kV DC/SC line from Kamalapuram 132/33 kV SS in Warangal district to the proposed 132/33 kV N.V.PuramSS		5.50
		132kV	220kV DC/SC line on Galvanized JC Tower with Moose conductor in Godavari river crossing area.		4.50
6	Khammam	132kV	132/33kV Substation at Arempula	48.00	
			132kV DC line to proposed Arempula 132/33kV SS by making LILO of second circuit of existing 132kV DC line from 220/132kV Budidampadu SS to 132kV Khammam Substation		30.00
7	Nalgonda	132kV	132/33 KV Sub station at Toopranpet	47.50	41.00
	Nalgonda	132kV	2nd circuit stringing upto loc.no.13 of 132 KV Ramannapet - Choutuppal DC/SC line from Ramannapet 132 KV SS.		
8	Nalgonda	132kV	132/33 KV SS Salkanoor	32.00	23.50
	Nalgonda	132kV	132 KV DC/SC line from Miryalaguda 220/132 KV SS to the proposed 132/33 KV SS Salkanoor		
9	Nalgonda	132kV	132/33 KV SS at Gudipally	63.00	12.00
	Nalgonda	132kV	132 KV LILO line of 220 KV KMPally-132 KV Kodandapur DC/SC line to the proposed 132/33 KV SS at Gudipally		
10	Ranga Reddy	132kV	(i) Erection of 132 KV SS at Donthanpalli(1x31.5 MVA +1x16MVA), (ii) 132 KV LILO from 132 KV Yeddumailaram- Dharmasagar line with Zebra conductor (0.5KM) (iii) 132 KV DC line from the proposed 220KV SS Parigi to 132/33KV SS Dharmasagar(35Kms) (iv) 2 Nos. 132 kV Bay extensions at 220 kV Parigi SS and (v) 2 Nos 132 kv Bay extensions at 132 kV Dharmasagar SS	47.50	71.00
11	Ranga Reddy	132kV	Erection of 132/33KV SS at Mylardevpalli MD Pally (Kattedan) (2x50 MVA) and 132 KV DC UG XLPE cable from 220/132/33 KV Shivarampally SS (3.5 KM) to proposed MD Pally and 1 No. 132 KV Bay extension at 220 KV Shivarampally SS	100.00	7.00
12	Ranga Reddy	132kV	Erection of 132 KV SS Kandukuru (1x31.5 MVA +1x16MVA)and 132 KV DC/SC line from 220 KV Fab city to 132 KV Kandukuru (18 Kms)(11 km on Narrow Based towers and 7 kms on Normal Towers) and 1 No.132 kV bay at 220 kv Fabcity SS	47.50	18.00
13	Ranga Reddy	132kV	Erection of 132/33 Kv SS Dommara Pochampally (DP Pally) (2x16 MVA) , 132 kV LILO(DCUG XLPE Cable) to DP Pally from 132 kV Shapurnagar-Gummadidala line (between Loc 310 and Loc 311) (3.6 KM) and replacement of existing ACSR Wolf conductor withHTLS(High Temp. and Low sag) conductor from 220 kV Shapurngar to132 kv Gummadidala SS(21 KM)	32.00	49.20
14	Ranga Reddy	132kV	(i) Erection of 132 kV DC line on NBMC towers with LILO of 132 kv Ibrahimpatnam-Turkyamjal SC line to the proposed 220 kV Bonguluru SS- 5 km (ii)Erection of 132 kV DC UG XLPE Cable with LILO of 132 kv Ibrahimpatnam-Turkyamjal SC line to the proposed 220 kV Bonguluru SS- 3 km		16.00
15	Ranga Reddy	132kV	Erection of 132/33 kV SS at Khaitalapur(2x31.5 MVA Transformers) and 132 kV DC XLPE (UG CABLE) from 220 kVMiyapur SS to 132 kv Khaitalapur SS (7.5 KM) and 2 Nos,132 kv Bay extensions at 220 kv Miyapur SS	63.00	15.00
16	Ranga Reddy	132kV	132/33 kV Substation at Ibrahimbagh	160.00	
	Ranga Reddy	132kV	132 kV DC line with 630 Sq. MM XLPE UG Cable from LILO point loc.no. 67 for LILO of 132 kV SC Line from 220 kV SS Shivrampally to 132 kV SS E'gadda to the now proposed 132/33 kV Sub-Station, Ibrahimbagh		4.00
17	Karimnagar	132kV	132/33 kV Substation at Nimmapalli	32.00	
	Karimnagar	132kV	132kV DC/SC line from proposed 132kV Chippalapally to the proposed 132/33 kV Nimmapalli SS		45.00
18	MBNR	132kV	132 kV line from 220 kV Jurala Sub-Station to 132 kV leeza Sub-Station under the program of providing 9.00 Hrs agricultural supply during day time		35.00

Sl. No	District	Voltage	Name of the Transmission Line/SS	PTR Capacity	Line (KM)
19	MBNR	132kV	132/33 kV Substation at Narayanpet	63.00	
		132kV	132kV DC/SC line from 132/33kV Marikal Substation to proposed 132/33kV Narayanpet Substation.		15.00
20	Medak	132kV	132/33 KV Wattipally Substation at Shadnagar(V) Hamelt of Wattipally (	32.00	23.00
	Medak	132kV	132KV DC/SC line from Jogipet 132 KV Substation to the proposed 132/33 KV Substation at Shadnagar(V) Hamelt of Wattipally (23 KM)		
21	Medak	132kV	132KV SS Ganeshpally	63.00	24.00
	Medak	132kV	ii)Stringing of 2nd circuit upto location 34 of 132KV DC/SC Gajwel 400/220/132KV SS-132KV Tumki bollaram SS line on the existing DC/SC towers with panther conductor(12km)		
	Medak	132kV	Erection of 132KV line with panther conductor on Galvanised towers for LILO of one circuit of Gajwel 400/220/132KV SS-Tumki bollaram 132KV line to proposed 132KV SS Ganeshpally(6km)		
22	Medak	132kV	132/33KV SS at Duddeda	63.00	30.00
	Medak	132kV	Erection of 132KV DC line with panther conductor on galvanized towers for LILO of one circuit of 132KV Siddipet-Gajwel line to the proposed Duddeda 132KV SS(15km)		
23	Medak	132kV	132/33KV Kondapur SS	63.00	20.00
	Medak	132kV	132KV DC/SC line with Zebra conductor on Galvanised towers from 132KV Maddur SS to the proposed 132/33KV Kondapur SS		
	Medak	132kV	Erection of 132KV DC/SC line from 132KV Doulatabad SS to proposed 220KV Toopran SS(25km)		
24	Medak	132kV	Erection of 132 KV DC line from proposed 400/220/132 KV NarasapurSS to existing 132 KV Gummadidala SS(17.25 KM)		34.50
25	Medak	132kV	Erection of LILO of 132 KV Narsapur-Koudipalli at proposed 400/220/132 KV NarasapurSS(17.25 KM)		34.50
26	Medak	132kV	132/33 kV substation Chandulapur	63.00	
	Medak	132kV	Erection of 132 kV DC line with panther ACSR conductor on galvanized towers for LILO of 132 kV line from 220 kV Siddipet to 132 kV SS Ellanthakunta to the now proposed 132/33 kV substation Chandulapur		8.00
27	Nalgonda	132kV	132/33 KV Munagala SS	48.00	86.00
	Nalgonda	132kV	132 kV DC line (37 KM) from 400 kV Suryapet to existing 132 kV Kodada with 1 circuit LILO (6 KM) to the upcoming 132 kV Munagala SS.		
28	Warangal	132kV	132/33 kV Substation at Palakurthy	32.00	
	Warangal	132kV	132kV DC/SC line from Waddekothapally 220/132kV SS to the proposed 132/33kV Palakurthy SS		29.00
29	Warangal	132kV	132/33 kV Substation at Nellikuduru	47.50	
	Warangal	132kV	132kV DC/SC line from 132/33kV Ayyagaripally SS to the proposed 132/33kV Nellikuduru SS		30.00
30	Warangal	132kV	132/33 kV Substation at Inavole	32.00	
	Warangal	132kV	2 nd circuit on 132kV DC/SC line from Waddekothapally 220/132 kV Substation to the proposed 132/33 kV Palakurthy Substation		29.00
	Warangal	132kV	132 kV DC/SC line from the proposed 132/33 kV Palakurthy substation to the proposed 132/33 kV Inavole substation		30.00
31	Warangal	220kV	132KV DC/SC line from the proposed 220/132 KV SS, Ayyagaripally to 132 KV SS, Nekkonda.		45.00
			Total	**1406.50**	**914.70**

Sl. No	District	Voltage	Name of the Transmission Line/SS	PTR Capacity	Line (KM)
1	Adilabad	220kV	Erection of 220 kV DC line from the proposed 400 / 220kV Nirmal SS to the existing 220kV Nirmal SS		20.00
2	Adilabad	220kV	Erection of 220kV DC line from the proposed 400/220 kV Nirmal SS to the existing 220 kV Jagityal SS		120.00
3	Karimnagar	220kV	2nd circuit stringing on existing 220 kV DC/SC line from 220 kV Ramagundam SS to 220 kV Mandamarri (Bellampally) SS		37.00
4	Karimnagar	1220kV	Erection of 220/132 Sub-Station at Sircilla in Karimnagar District	300.00	
			Erection of 220KV DC line with Moose ACSR on Galvanised Towers from 400/200 KV SS, Durshed to the proposed 220KV SS Siricilla.		134.00
5	Mahaboobnagar	220kV	220KV features at 132/33 KV SS Kosigi.	200.00	101.00
	Mahaboobnagar	220kV	220KV DC line(41KM) from proposed 220KV Parigi to 220/132KV Kosigi SS		
6	Mahaboobnagar	220kV	220/132 KV Jadcherla SS	200.00	40.00
	Mahaboobnagar	220kV	220 KV DC line radially from proposed 220 KV Thimmajipet Switching Station to the proposed 220/132 KV Jadcherla SS(20 KM)		
7	Mahaboobnagar	220kV	220/132KV SS at Kothur	300.00	40.00
	Mahaboobnagar	220kV	220KV DC line with Moose ACSR on Galvanised towers from proposed 400/220KV Maheswaram SS to the proposed 220KV Kothur SS(20KM)		
8	Medak	220kV	220/132/33KV SS Toopran(25km)	263.00	79.00
	Medak	220kV	Erection of 220KV DC line from proposed Narsapur 400/220/33KV SS to the proposed 220/132/33KV SS Toopran(25km)		
	Medak	220kV	Erection of 220KV DC line for LILO of one circuit 220KV DC line from Gajwel 400KV SS to Minpur 220KV SS(2km)		
9	Nalgonda	220kV	220 kV features at existing 132 kV Sithapuram Switching Station,	160.00	
10	Nizambad	220kV	Erection of 220/132kV SS at Renzal in Nizamabad District	200.00	
	Nizambad	220kV	Erection of 220kV DC line from the proposed 400/ 220kV Nirmal SS to the proposed upgraded 220/ 132kV Renzal SS		200.00
11	Ranga Reddy	220kV	Erection of 220 KV Raidurg SS (2x100 MVA +2x50 MVA) and 220 KV LILO UG XLPE Cable to Raidurg from Gachibowli - Shapurnagar line	300.00	8.00
12	Warangal	220kV	220/33kV features at existing Salivagu 220/11kV Lift Irrigation Substation in Warangal District.	63.00	0.00
13	Warangal	220kV	Erection of 220/132 Sub-Station at Ayyagaripally in Warangal District	200.00	
	Warangal	220kV	Erection of 220KV Line with Four (4) Circuts on Multi-circuit Towers for LILO of both the Circuits of 220KV Warangal-Boodidampadu DC Line at proposed 220KV SS Ayyagaripally.		28.00
14	Warangal	220kV	Erection of 220/132 Sub-Station at Jangaon in Warangal District	200.00	
	Warangal	220kV	220KV DC line with Moose ACSR on Galvanised Towers from 400/200 KV SS, Oglapur to the proposed 220 KV SS, Jangaon.		172.00
			Total	**2386.00**	**979.00**

13.3.5 Proposed Infrastructure Additions in FY 2017-18 – SS and Transmission Lines

Sl. No	District	Voltage	Substations & Lines programmed	Line length (CKM)	MVA
1	Adilabad	132kV	132kV SS Wankidi	25	63
2	Karimnagar	132kV	132kV SS Ramasagar	30	63
3	Karimnagar	132kV	132kV SS Choppadandi or Ramadugu	35	63
4	Khammam	132kV	132kV SS Lakshmipuram	25	63
5	Nizamabad	132kV	132kv SS Mangalpahad	25	63
6	Nizamabad	132kV	132kV SS Kotagiri	30	63
7	Warangal	132kV	upgradation of 132kv ss to 220kv Nekkonda	15	63
8	Warangal	132kV	132kV SS Regonda/Shyampeta	12	63
9	MBNR	132kV	132kV SS Jinikunta	12	63
10	Ranga Reddy	132kV	132kV SS Monda Market	25	63
11	Ranga Reddy	132kV	132kV SS Mohammad Nagar (Yakatpura)	25	63
12	Ranga Reddy	132kV	132kV SS Kanchanbagh	25	63
13	Ranga Reddy	132kV	132kV SS Chanchalguda	25	63
			Total	**309**	**819**
1	Ranga Reddy	220kV	ITIR-Phase-II (i) 220KV Raviral	10	200
2	Ranga Reddy	220kV	(ii)220kV SS Sardarnagar	10	200
3	Ranga Reddy	220kV	(iii) 220kV SS Mankhal	10	200
4	Ranga Reddy	220kV	(iv) 220kV SS Nadargul	10	200
5	Ranga Reddy	220kV	ITIR-Phase-I (ii) 220KV SS Golconda	10	200
6	Ranga Reddy	220kV	Jaipur Transmission scheme (i)Erection of 220 kV Shapurnagar Extension SS with 6 Nos 220 kV Bays-	-	
7	Ranga Reddy	220kV	(ii)Erection of interconnection to 220 kV Shapurnagar extension SS from existing 220 kVShapurnagar SS witrh single Moose DC	1	
8	Ranga Reddy	220kV	(iii)Erection of 220 kv Single Moose DC line from 400 kV Narsapur SS to 220 kVShapurtnagar Extrension SS	70	
9	Ranga Reddy	220kV	iv) Erection of LILO of 2nd ckt of Shapurnagar -Gachibowli DC line to 220 kVMiyapur SS(UG XLPE Cable)	5	
10	Ranga Reddy	220kV	(v)Erection of shifting of 220 kV Shapurnagar -Miyapur lines to the 220 kV Shapurnagar ExtensionSS	1	
11	Ranga Reddy	220kV	(vi) Erection of 220 kv Single Moose DC line from 400 kV Narsapur SS to 220 kVMiyapur SS	90	
12	Medak	220kV	220KV Zaheerabad SS & Connected lines	20	200
13	Nalgonda	220kV	220KV Nalgonda & Connected lines	43	200
			Total	**280**	**1400**

13.3.6 Proposed Infrastructure Additions in FY 2018-19 – SS and Transmission Lines

Sl. No	District	Voltage	Substations & Lines programmed to be charged	Line length CKM	MVA
1	Ranga Reddy	132kV	132kV SS R P Nilayam	6.00	63
2	Ranga Reddy	132kV	132kV SS Madinaguda	10	63
3	Ranga Reddy	132kV	132kV SS Kachavani Singaram	12	63
4	Ranga Reddy	132kV	132kV SS Chengicherla	10	63
5	Ranga Reddy	132kV	132kV SS Bowenpally	3	63
6	Ranga Reddy	132kV	132kV SS Aziz Nagar	8	63
7	Ranga Reddy	132kV	132kV SS Shabad	12	63
8	Ranga Reddy	132kV	132kV SS Banjara Hills	25	63
9	Karimnagr	132kV	132kV SS Between Adavipadira & Rangampet	25	63
10	Warangal	132kV	132kV SS Fort Warangal	12	63
11	Warangal	132kV	132kV SS Enugalu	12	63
12	Warangal	132kV	Providing of alternate source to 132/33 kV SS, Mustyala	15	63
13	Nizamabad	132kV	132kV SS Madnoor near Lachan Gate	25	63
14	MBNR	132kV	132kV SS Kondapur	15	63
15	MBNR	132kV	132kV SS Koilkonda	20	63
16	MBNR	132kV	132kV SS Bijnapally	16	63
			Total	**226**	**1008**
1	Nalgonda	220kV	220KV Chowtuppal & Connected lines	30	200
2	Ranga Reddy	220kV	220kV Ramachandrapuram	25	200
3	Ranga Reddy	220kV	220kV Turkayamjal	25	200
			Total	**80**	**600**

14. **Annexure – 3**
Distribution

14. Annexure -3 Distribution

14.1 TSSPDCL Proposed Schemes – DDUGJY

Sl. No.	District	Units	Quantity	Total Cost
A. Feeder Separation (Network Strengthening)				
1	33 KV Feeder	Kms		-
2	11 KV Feeder	Kms	24219	89852.49
3	LT Line	Kms	8880	23709.60
4	Distribution Transformer (s-ph)	MVA/No	9746	6529.82
5	Requirement of addl. Bays including VCBs, etc.	Nos.	2284	8336.60
	Total			**128428.51**
B. Strengthening of Sub-Transmission and Distribution Network (Network Strengthening)				
1	33/11 KV or 66/11 KV SS :			
	New substation	Nos	142	17750.00
	Additional Transformer	Nos	801	2643.30
	Augmentation Enhancement	Nos	485	25991.15
2	Brief Scope of R&M works in existing 33/11 KV or 66/11 KV substations (details of Substations & works to be provided in DPR)	Nos.	599	2995.00
3	33 KV feeders			
	New	Kms	836	4038.85
	Augmentation	Kms	1347	6506.01
	No. of bays with breakers required	Nos.	175	3491.25
4	New 11 KV feeders-			
	New	Kms	995	3680.02
	Augmentation	Kms	8057	22940.21
5	Distribution Transformer- New (3-phase)	MVA/No	17625	20268.75
6	Distribution Transformer- R&M	Nos.	92469	9246.90
7	LT Line	Km		
	New	Kms	16095	42956.59
	Augmentation	Kms	33862	90375.65
8	Capacitor Bank	MVAR	219	1905.30
9	Aerial Bunched Cables	Km	9550	17381.00
	Total			**272169.97**
C. Metering (Measures for AT&C loss reduction)				
1	Feeder	Nos	3899	410.06
2	Distribution Transformer	Nos	108610	6900.09
3	Consumers (s-phase)	Nos	286177	2575.59
	Consumers (3-phase)	Nos.	718493	14369.86
	Total			24255.60
	High Voltage Distribution System (HVDS) - Proposed feeders	Nos.	275	55000.00
	RE Component (RGGVY XII Plan)			24489.91
	Total			**504344.00**

14.2 TSSPDCL Proposed Schemes – IPDS

S. No.	Parameters	Item	Unit	Quantity	Total Cost (Rs. Lakhs)
1a	S/S (network strengthening) SS additions	33/11 KV SS : New	MVA	1592	33160
1b	S/S PTR additions in existing substations	33/11 KV SS : Capacity Enhancement	MVA	4080	26344
1c	S/S - PTR additions in S/S	Bay Extension with 33 Kv breaker	Nos	35	699
2	S/S (R&M new head)	33/11 KV SS : R&M	Nos	228	1140
3a	33 kv Feeder O/H (SS additions)	33 KV feeders- New	Km	568	10863
3b	33 kv Feeder O/H (AT&C loss reduction, feeder augmentation	33 KV feeders- Augmentation	Km	11	44
3c	33 kv feeder (feeder additions under network strengthening)	Bay extension at existing SS with 9.1mt poles	Nos	84	969
3d	33 kv feeder UG (feeder additions under network strengthening)	33KV Under-ground cables -300sqmm	KM	239	14818
4a	11 kv feeder OH (feeder additions under N/W str)	11 KV feeders- New/Bifurcation	Km	1515	5620
4b	11 kv feeder OH (feeder additions under N/W stre)	Bay Extension with 11 Kv breaker	Nos	266	1048
4c	11 kv feeder OH (Augmentation for AT&C loss reduction)	11 KV feeders- Augmentation	Km	1235	2470
5	LT - new (DTR unit additions under n/w stre)	Distribution Transformer-New	MVA	0	0
5a	LT - new (DTR unit additions under n/w stre)	500 KVA	MVA	74	1396
5b	LT - new (DTR unit additions under n/w stre)	315 KVA	MVA	85	2079
5c	LT - new (DTR unit additions under n/w stre)	160 KVA	MVA	179	3627
5d	LT - new (DTR unit additions under n/w stre)	100 KVA	MVA	618	14882
6	LT - new (DTR R&M new head)	Distribution Transformer-R&M	Nos.	17211	8606
7	LT-existing (DTR additions under n/w str)	Capacity enhancement of LT sub-station	MVA	0	0
7a	LT-existing (DTR additions under n/w str)	100 to 160 KVA	MVA	377	7657
7b	LT-existing (DTR additions under n/w str)	160 to 315 KVA	MVA	433	10539
7c	LT-existing (DTR additions under n/w str)	315 to 500 KVA	MVA	133	2499
7d	LT-existing (DTR additions under n/w str)	63 to 100 KVA	MVA	260	6254
8a	LT new feeder (feeder additions under n/w str)	LT Line : New Feeder	Km	3234	10809
8b	LT new feeder (feeder additions under n/w str)	LT Line : Feeder Bifurcation	Km	2859	9497
8c	LT (AT&C loss reduction)	LT Line : Augmentation	Km	3031	6483
8d	LT (AT&C loss reduction)	LT Line : Conversion from single phase to three phase	Km	940	1399
9	HVDS	HVDS	Nos	18	39
10	can be included in DSM	Capacitor Bank	MVAR	370	2541
11a	11kvOH (laying of AB cables in AT&C loss reduction)	11 Kv Aerial Bunched Cables	Km	962	10448
11b	LT OH (laying of AB cables in AT&C loss reduction)	LT Aerial Bunched Cables-LT 70 sqmm	Km	2221	6252
12a	11kv UG (feeder additions under n/w str)	11Kv Under-ground cables -300sqmm	Km	482	16352
12b	11kv UG (feeder additions under n/w str)	11Kv Under-ground cables -185sqmm	Km	84	2772

S. No.	Parameters	Item	Unit	Quantity	Total Cost (Rs. Lakhs)
12c	It UG (feeder additions)	LT- Under-ground cables	Km	212	1554
13	Roof top Solar Panels	Rooftop Solar projects	Nos	3880	2073
14a	Metering OH (meter replacement under AT&C losses)	Metering - Feeders	Nos	730	146
14b	Metering OH (meter replacement under AT&C losses)	Metering - Boundary Point	Nos	420	756
14c	Metering OH (meter replacement under AT&C losses)	Metering - DTRs	Nos	15900	3180
14d	Metering OH (meter replacement under AT&C losses)	Metering -Consumers	Nos	1223486	24470
15	Metering OH (meter replacement under AT&C losses)	Prepaid / smart meters in Govt. establishment	Nos	21383	1924
16	Metering OH (meter replacement under AT&C losses)	AMI, Smart meters	Nos	390506	35146
17a	RMUs-3 OH (feeder addition n/w strn)	RMUs-3 way	Nos	582	2625
17b	RMUs-3 OH (feeder addition n/w strn)	RMUs-5 way	Nos	621	8377
	Total				**301,555**

14.3 TSNPDCL Proposed Schemes – DDUGJY

	Parameters	Unit	Quantity	Amount (Rs Lakks)
Physical separation of HT feeders (11KV) for Agricultural & non-Agricultural consumers.				
A	Erection of 11 KV line	Kms	5333.32	17,533.77
B	Erection of 6.3KV line	Kms	1402.00	1,837.80
C	Erection of LT line	Kms	931.00	2,324.53
D	Erection of 25 KVA DTR	Nos.	7894	12,381.90
E	Erection of 16 KVA DTR	Nos.	1078	1,506.99
F	Erection of 15 KVA DTR	Nos.	5782	3,070.24
G	Erection of 11 KV VCB's	Nos.	324	1,031.01
H	Erection of 11 KV Bay extensions	Nos.	300	458.41
	Total		**23043.765**	**40,144.65**
Laying of new HT feeders (11KV line)				
1	Erection of new 11 kv line with 55 sq.mm AAA conductor over 9.1 mts. PSCC poles at 60 mts. Span, 75 Kg/sq.mts. Wind pressure, working load 280 Kgs. (For New 33/11 KV Sub-Stations)	KMs	517.298	1,700.67
	Total		**517.298**	**1,700.67**
Laying of new LT lines				
1	Erection of new LT lines with conductor	KMs	1883.842977	4,703.60
2	Erection of new LT lines with 3x16+1x25 AB Cable	KMs	1352.08	2,389.11
3	Providing of LT UG Cable in high dense Area	KMs	6	36.09
	Total		**3241.924016**	**7,128.81**

	Parameters	Unit	Quantity	Amount (Rs Lakks)
Creation of new substations				
1	Erection of 33/11 kv SS with 2x5 mva Power Transformer and NF = 4 No. 11 kv feeders (without 11 kv 2 MVAR Capacitor Bank)	Nos	11.4	1,856.87
2	Erection of 33/11 kv SS with 1x5 mva Power Transformer and NF = 3 No. 11 kv feeders (without 11 kv 2 MVAR Capacitor Bank)	Nos	33	3,641.10
	Total		**44.2**	**5,497.96**
Erection of Additional PTRs at the existing substations				
1	Erection of addl PTRs (1x5MVA) (Schedule-2)	Nos.	24	941.98
2	Erection of addl PTRs (1x8MVA) (Schedule-3)	Nos.	0	9.75
3	Erection of PTR Plinths (Schedule-4)	Nos.	21	19.62
4	Erection of 33KV VCBs	Nos.	3	14.55
5	Erection of 11KV LV VCBs	Nos.	35	112.72
	Total		**83.4**	**1,098.61**
Augmentation of PTRs in existing Sub-Stations				
1	Augmentation of PTR capacity from 3.15 MVA to 5.0 MVA	Nos	15.4	598.26
2	Augmentation of PTR capacity from 5.0 MVA to 8.0 MVA	Nos	11.2	545.80
	Total		**26.6**	**1,144.06**
Laying of 66KV/33KV lines and augmentation of existing lines				
1	Augmentation of PTR capacity from 5.0 MVA to 8.0 MVA Erection of 33 kv line with 100 sq.mm AAA conductor over 9.1 mts. PSCC poles at 80 mts. Span, 75 Kg/ sq.mts. wind pressure, working load 280 Kgs.(For erection of new Sub-stations)	Km	208.072	876.16
	Total		**208.072**	**876.16**
Installation of new distribution transformers including Specially Designed Transformers (SDTs) and augmentation of existing un-metered connections, replacement of faulty meters and conversion of electro-mechanical to static meters				
1	Erection of 15 KVA DTR	Nos.	2174.8	1,154.82
2	Erection of 25 KVA DTR	Nos.	2764	4,335.36
3	Erection of 63 KVA DTR	Nos.	348.4	759.18
4	Erection of 100 KVA DTR	Nos.	529.2	1,385.48
5	Erection of 160 KVA DTR	Nos.	6.6	18.03
6	Erection of 11 KV line	Kms	1815.714	5,969.33
7	Erection of 6.3 KV Line		0	-
8	Erection of LT line	Kms	1418.77	3,542.40
9	Erection of LT line with 3x16+1x25 AB cable	Kms	795.948	1,406.43
	Total		**9853.432**	**18,571.03**
Relocation of meters & replacement of service cables.				
1	Relocation of meters (Including 5 mts service wire)	No	149693	138.52
	Total		**149692.61**	**138.52**
Laying of Aerial Bunched Cables (ABC) and service lines				
1	Erection of LT line with 3x16+1x25 AB cable	Kms	137.564	243.07
	Total		**137.564**	**243.07**

	Parameters	Unit	Quantity	Amount (Rs Lakks)
Re-conducting (replacement and up-gradation) of existing HT and LT feeders				
1	Re-conducting (replacement and up-gradation) of existing HT feeders	Kms	4310.51	8,194.59
2	Re-conducting (replacement and up-gradation) of existing LT feeders	Kms	2910.36	8,175.74
	Total		**7220.877**	**16,370.33**
Other specific works for achieving the objectives of the scheme				
A. Procurement & Installation of meters				
1	Procurement & Installation of meters for DTRs	Nos	24686	3,406.48
2	Procurement & Installation of meters for feeders and HT services	Nos	220	75.59
3	Procurement & Installation of meters for conversion of electro-mechanical to static meters (S-Ph)	Nos	61158	1,615.19
	Total		**86064.28**	**5,097.26**
B. Capacitor Banks				
1	Data requirement for erection of 2MVAR capacitor banks	Nos	44	587.16
2	Data requirement for erection of 600 KVA capacitor banks	Nos	104	339.68
	Total		**147.8**	**926.84**
C. Conversion Of Existing Lines				
1	Conversion of s-ph 2W/L to 3 ph 5W/L	KMs	407.454	901.95
2	Conversion of s-ph 3W/L to 3 ph 5W/L	KMs	270.078	503.91
3	Conversion of 3-ph 4W/L to 3 ph 5W/L	KMs	282.812	429.31
	Total		**960.344**	**1,835.17**
D. Ring Fencing				
1	Proving of HT metering set at Boundary point	No	0.8	1.46
	Total		**0.8**	**1.46**
E. SCADA Items				
1	RMUs	Nos	5.6	57.68
2	Sectionalizers	Nos	20.2	105.24
3	FPIs	Nos	5	6.05
4	11 KV line required for erection of RMUs	KMs	5.40	17.75
	Total		**36.2**	**186.73**
		Grand Total (Inclusive of additional investments)		**150,164.46**

14.4 TSNPDCL Proposed Schemes – IPDS

	Parameters	Unit	Quantity	Amount (Rs Lakks)
Physical separation of HT feeders (11KV) for Agricultural & non-Agricultural consumers.				
A	Erection of 11 KV line	Kms	205.18	674.56
B	Erection of 6.3KV line	Kms	75.71	99.25
C	Erection of LT line	Kms	61.46	153.45
D	Erection of 25 KVA DTR	Nos.	108	168.88
E	Erection of 16 KVA DTR	Nos.	49	68.50
F	Erection of 15 KVA DTR	Nos.	58	30.62
G	Erection of 11 KV VCB's	Nos.	21	65.80
H	Erection of 11 KV Bay extensions	Nos.	18	28.05
	Total		**595.69**	**1289.11**
Laying of new HT feeders (11KV line)				
1	Erection of new 11 kv line with 55 sq.mm AAA conductor over 9.1 mts. PSCC poles at 60 mts. Span, 75 Kg/sq.mts. Wind pressure, working load 280 Kgs.	Nos.	24	941.98
	Total		**146.04667**	**480.14**
Laying of new LT lines				
1	Erection of new LT lines with conductor	KMs	687.73	1717.13
2	Erection of new LT lines with 3x16+1x25 AB Cable	KMs	330.66	584.27
	Providing of LT UG Cable in high dense Area	KMs	20.92	125.83
	Total		**1039.3067**	**2427.23**
Creation of new substations				
1	Erection of 33/11 kv SS with 2x5 mva Power Transformer and NF = 4 No. 11 kv feeders (without 11 kv 2 MVAR Capacitor Bank)	Nos	6	1031.59
2	Erection of 33/11 kV SS with 1x5 MVA Power Transformer and NF = 3 No. 11 kV feeders (without 11 kv 2 MVAR Capacitor Bank)	Nos	10	1110.09
	Total		**16.333333**	**2141.68**
Erection of Additional PTRs at the existing substations				
1	Erection of addl PTRs (1x5MVA) (Schedule-2)	Nos.	18	693.40
2	Erection of addl PTRs (1x8MVA) (Schedule-3)	Nos.	4	178.69
3	Erection of PTR Plinths (Schedule-4)	Nos.	21	20.32
4	Erection of 33KV VCBs	Nos.	7	30.32
5	Erection of 11KV LV VCBs	Nos.	28	90.22
	Total		**77.666667**	**1012.94**
Augmentation of PTRs in existing Sub-Stations				
1	Augmentation of PTR capacity from 3.15 MVA to 5.0 MVA	Nos	15	582.72
2	Augmentation of PTR capacity from 5.0 MVA to 8.0 MVA	Nos	11	812.21
3			0	0.00
	Total		**26.333333**	**1394.93**

	Parameters	Unit	Quantity	Amount (Rs Lakks)
Laying of 66KV/33KV lines and augmentation of existing lines				
1	Erection of 33 kv line with 100 sq.mm AAA conductor over 9.1 mts. PSCC poles at 80 mts. Span, 75 Kg/sq.mts. wind pressure, working load 280 Kgs.(For erection of new Sub-stations)	Km	62.02	261.14
	Total		**62.016667**	**261.14**
Installation of new distribution transformers including Specially Designed Transformers (SDTs) and augmentation of existing un-metered connections, replacement of faulty meters and conversion of electro-mechanical to static meters.				
1	Erection of 15 KVA DTR	Nos.	250	132.57
2	Erection of 25 KVA DTR	Nos.	329	516.56
3	Erection of 63 KVA DTR	Nos.	133	289.09
4	Erection of 100 KVA DTR	Nos.	460	1205.18
5	Erection of 160 KVA DTR	Nos.	149	407.09
6	Erection of 11 KV line	Kms	421.92	1387.10
7	Erection of LT line	Kms	388.71	970.54
8	Erection of LT line with 3x16+1x25 AB cable	Kms	138.28	244.35
	Total		**2269.9167**	**5152.48**
Relocation of meters & replacement of service cables.				
1	Relocation of meters (Including 5 mts service wire)	No	137138	126.90
	Total		**137138.47**	**126.90**
Laying of Aerial Bunched Cables (ABC) and service lines				
1	Erection of LT line with 3x16+1x25 AB cable	Kms	14.41	25.46
	Total		**14.406667**	**25.46**
Re-conducting (replacement and up-gradation) of existing HT and LT feeders				
1	Re-conducting (replacement and up-gradation) of existing HT feeders	Kms	1001.74	1904.38
2	Re-conducting (replacement and up-gradation) of existing LT feeders	Kms	1962.16	5512.07
	Total		**2963.9067**	**7416.46**
Other specific works for achieving the objectives of the scheme.				
A. Procurement & Installation of meters				
1	Procurement & Installation of meters for DTRs	Nos	10185	1405.47
2	Procurement & Installation of meters for feeders and HT services	Nos	194	66.78
3	Procurement & Installation of meters for conversion of electro-mechanical to static meters (S-Ph)	Nos	128399	3391.01
	Total		**138778.18**	**4863.27**
B. Capacitor Banks				
1	Data requirement for erection of 2MVAR capacitor banks	Nos	66	884.76
2	Data requirement for erection of 600 KVA capacitor banks	Nos	156	508.43
	Total		**221.66667**	**1393.19**
C. Conversion Of Existing Lines				
1	Conversion of s-ph 2W/L to 3 ph 5W/L	KMs	227.79	504.24
2	Conversion of s-ph 3W/L to 3 ph 5W/L	KMs	389.89	727.45
3	Conversion of 3-ph 4W/L to 3 ph 5W/L	KMs	185.20	281.13
	Total		**802.87667**	**1512.83**

	Parameters	Unit	Quantity	Amount (Rs Lakks)
D. Ring Fencing				
1	Proving of HT metering set at Boundary point	No	31	56.77
	Total		**31**	**56.77**
E. SCADA Items				
1	RMUs	Nos	453	4665.90
2	Sectionalizers	Nos	997	5196.11
3	FPIs	Nos	212	256.52
4	11 KV line required for erection of RMUs	KMs	120.1	394.84
	Total		**1782.4333**	**10513.37**
		Grand Total (Inclusive of additional investments)		**41,271.68**

14.5 Distribution Investments prioritization plan

14.5.1 TSSPDCL

DDUGJY - Investments				IPDS - Investments			
Circle Name	High	Medium	Low	Circle Name	High	Medium	Low
Load Growth and Network Strengthening							
Mahabubnagar	171	123	155	Mahabubnagar	50	30	78
Nalgonda	150	190	304	Nalgonda	34	27	48
Medak	86	167	620	Medak	34	27	62
Ranga Reddy South	31	108	297	Ranga Reddy South	7	6	14
Ranga Reddy North	13	21	20	Ranga Reddy North	-	-	-
Ranga Reddy East	13	29	29	Ranga Reddy East	12	9	11
HUA	-	-	-	HUA	572	669	344
Total	**464**	**639**	**1,426**	**Total**	**708**	**769**	**559**
Technology Upgradation, Renovation and Moderization Schemes							
Mahabubnagar	-	-	-	Mahabubnagar	-	-	-
Nalgonda	-	-	-	Nalgonda	-	-	-
Medak	-	-	-	Medak	-	-	-
Ranga Reddy South	-	-	-	Ranga Reddy South	-	-	-
Ranga Reddy North	-	-	-	Ranga Reddy North	-	-	-
Ranga Reddy East	-	-	-	Ranga Reddy East	-	-	-
HUA	-	-	-	HUA	-	-	-
Total	**-**	**-**	**-**	**Total**	**-**	**-**	**-**

DDUGJY - Investments				IPDS - Investments			
Circle Name	High	Medium	Low	Circle Name	High	Medium	Low
AT&C Loss Reduction Measures							
Mahabubnagar	480	61	210	Mahabubnagar	30	28	7
Nalgonda	440	54	140	Nalgonda	20	27	4
Medak	278	45	172	Medak	19	22	5
Ranga Reddy South	199	15	72	Ranga Reddy South	2	4	1
Ranga Reddy North	24	-	26	Ranga Reddy North	-	-	-
Ranga Reddy East	36	-	0	Ranga Reddy East	3	4	2
HUA	-	-	-	HUA	582	107	59
Total	**1,458**	**174**	**619**	**Total**	**656**	**192**	**79**
DSM Measures							
Mahabubnagar	5	-	-	Mahabubnagar	2	-	-
Nalgonda	10	-	-	Nalgonda	3	-	-
Medak	4	-	-	Medak	2	-	-
Ranga Reddy South	0	-	-	Ranga Reddy South	1	-	-
Ranga Reddy North	-	-	-	Ranga Reddy North	-	-	-
Ranga Reddy East	-	-	-	Ranga Reddy East	0	-	-
HUA	-	-	-	HUA	18	-	-
Total	**19**	**-**	**-**	**Total**	**25**	**-**	**-**
RE Plan							
Mahabubnagar	75	-	-	Mahabubnagar	-	-	3
Nalgonda	79	-	-	Nalgonda	-	-	3
Medak	83	-	-	Medak	-	-	2
Ranga Reddy South	3	-	-	Ranga Reddy South	-	-	0
Ranga Reddy North	3	-	-	Ranga Reddy North	-	-	-
Ranga Reddy East	3	-	-	Ranga Reddy East	-	-	-
HUA	-	-	-	HUA	-	-	18
Total	**245**	**-**	**-**	**Total**	**-**	**-**	**26**
Grand Total	**2,186**	**813**	**2,045**	**Grand Total**	**1,390**	**961**	**664**

14.5.2 TSNPDCL

DDUGJY - Investments				IPDS - Investments			
Circle Name	High	Medium	Low	Circle Name	High	Medium	Low
Load Growth and Network Strengthening							
Warangal	-	212	-	Warangal	33	9	-
Karimnagar	-	135	-	Karimnagar	15	4	-
Khammam	-	40	-	Khammam	9	4	-
Nizamabad	-	49	-	Nizamabad	35	7	-
Adilabad	-	87	-	Adilabad	13	5	-
Total	**-**	**522**	**-**	**Total**	**105**	**28**	**-**
Technology Up gradation, Renovation and Modernization Schemes							
Warangal	-	-	-	Warangal	-	13	-
Karimnagar	-	-	-	Karimnagar	-	2	-
Khammam	-	1	-	Khammam	-	8	-
Nizamabad	-	-	-	Nizamabad	-	61	-
Adilabad	-	1	-	Adilabad	-	21	-
Total	**-**	**2**	**-**	**Total**	**-**	**105**	**-**
AT&C Loss Reduction Measures							
Warangal	72	16	18	Warangal	-	45	15
Karimnagar	186	14	15	Karimnagar	-	8	8
Khammam	48	1	5	Khammam	-	6	1
Nizamabad	25	2	6	Nizamabad	-	20	17
Adilabad	52	8	10	Adilabad	-	19	9
Total	**383**	**40**	**52**	**Total**	**-**	**98**	**50**
DSM Measures							
Warangal	-	1	-	Warangal	-	3	-
Karimnagar	-	4	-	Karimnagar	-	1	-
Khammam	-	1	-	Khammam	-	1	-
Nizamabad	-	1	-	Nizamabad	-	9	-
Adilabad	-	2	-	Adilabad	-	-	-
Total	**-**	**9**	**-**	**Total**	**-**	**14**	**-**
RE Plan							
Warangal	-	120	-	Warangal	-	7	-
Karimnagar	-	139	-	Karimnagar	-	0	-
Khammam	-	68	-	Khammam	-	3	-
Nizamabad	-	68	-	Nizamabad	-	0	-
Adilabad	-	98	-	Adilabad	-	0	-
Total	**-**	**493**	**-**	**Total**	**-**	**12**	**-**
Grand Total	**383**	**1,067**	**52**	**Grand Total**	**105**	**257**	**50**

14.6 Circle Wise Electrification Plan for TSNPDCL

Sl No	Name of the district	No of Unelectrified households as on 31st March 2015	2015-16	2016-17	2017-18
1	Warangal	76,906	15,382	30,762	30,762
2	Karimnagar	75,595	15,119	30,238	30,238
3	Khammam	50,428	10,086	20,171	20,171
4	Nizamabad	47,198	9,440	18,879	18,879
5	Adilabad	69,893	13,979	27,957	27,957
	Total	**320,020**	**64,006**	**128,007**	**128,007**

14.7 Details of habitats under DDG in Mahabubnagar District of TSSPDCL

Sl No	Name of the district	No of Unelectrified households as on 31 Mar 2015	2015-16	2016-17	2017-18
1	Kollampenta	12	2	8	21.75
2	Rayaletipenta	18	3	10	28.64
3	Sangadigundala	13	2	8	21.55
4	Agarlapenta	4	1	10	17.86
5	Ballaveerammapenta	18	3	10	25.22
6	Bhourapur	15	3	15	26.82
7	Dharavagu	15	3	15	26.95
8	Doralapenta	6	1	15	19.75
9	Farhabad	7	1	6	16.63
10	Ippalamadatha	9	2	10	22.2
11	Jivvigundam	10	2	10	22.23
12	Mallapur	8	2	12	23.2
13	Medimalkala	11	2	8	21.49
14	Rampur	8	2	18	28.47
15	Kudichintalabailu	25	5	15	23.68
16	Appapur	35	6	28	31.06
17	Kommanapenta	22	5	18	19.27
18	Earlapenta	21	6	24	21.3
19	Thatigundala	23	6	26	22.88
20	Battichintala	23	5	11	16.99
21	Fathepur	28	6	13	19.91
22	Gundlapenta	34	7	13	22.33
	Total	**365**	**75**	**303**	**500.18**

14.8 Circle Wise Electrification Plan for TSSPDCL

Sl No	Name of the district	No of Unelectrified households as on 31 Mar 2015	2015-16	2016-17	2017-18
1	Mahabubnagar	159,552	31,910	63,821	63,821
2	Nalgonda	121,480	24,296	48,592	48,592
3	Medak	104,932	20,986	41,973	41,973
4	Ranga Reddy	15,604	3,121	6,242	6,242
	Total	**401,568**	**80,314**	**160,627**	**160,627**

14.9 Balance Sheets for DISCOMS

Balance Sheet projection for TSDISCOMS – Base Scenario

Balance sheet	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Assets					
Current assets					
Inventories	Rs. Crs	265.2	265.2	265.2	265.2
Trade receivables	Rs. Crs	2,023.6	2,023.6	2,023.6	2,023.6
Cash and Bank Balances	Rs. Crs	2,050.5	2,576.8	4,254.0	6,688.0
Short-term loans and advances	Rs. Crs	643.6	643.6	643.6	643.6
Other current assets	Rs. Crs	2,251.6	2,251.6	2,251.6	2,251.6
Total current Assets	**Rs.Crs**	**7,234.6**	**7,760.9**	**9,438.0**	**11,872.0**
Non-Current Assets					
Fixed Assets					
Gross Fixed Assets	Rs. Crs	17,974.5	24,992.3	30,757.7	35,934.6
Less: Depreciation	Rs. Crs	6,860.4	8,067.3	9,571.0	11,325.9
Capital work in progress	Rs. Crs	3,575.3	3,091.2	2,579.0	2,528.1
Intangible assets	Rs. Crs	10.7	10.7	10.7	10.7
Investments	Rs. Crs	418.1	423.7	429.8	436.4
Long term loans and advances	Rs. Crs	81.6	81.6	81.6	81.6
Other non-current assets	Rs. Crs	12.8	12.8	12.8	12.8
Total Fixed Assets	**Rs. Crs**	**15,212.6**	**20,545.0**	**24,300.6**	**27,678.3**
Total Assets	**Rs. Crs**	**22,447.2**	**28,305.9**	**33,738.7**	**39,550.3**
Liabilities					
Short-term borrowings	Rs. Crs	-	-	-	-
Trade payables	Rs. Crs	5,560.0	5,560.0	5,560.0	5,560.0
Other current liabilities	Rs. Crs	1,876.1	2,206.5	2,635.1	3,202.4
Short-term provisions	Rs. Crs	84.0	84.0	84.0	84.0
Working capital borrowings	Rs. Crs	175.9	212.4	252.4	294.6
Cash Deficit Loan	Rs. Crs	-	-	-	2,121.4
Long term loans	Rs. Crs	4,983.4	8,046.8	10,261.5	12,170.0
Other long term liabilities	Rs. Crs	1,269.8	1,941.3	3,348.3	5,337.2
Long term provisions	Rs. Crs	554.1	554.1	554.1	554.1
Payment due on Capital liabilities	Rs. Crs	-	-	-	-
Defferred tax liability	Rs. Crs	(226.6)	(226.6)	(226.6)	(226.6)
Total Liabilities	**Rs. Crs**	**14,276.6**	**18,378.4**	**22,468.8**	**29,097.1**
Share Capital	Rs. Crs	4,328.4	7,556.8	10,436.5	11,760.4
Reserves and Reserve funds	Rs. Crs	3,842.2	2,370.6	833.3	(1,307.2)
Total	Rs. Crs	8,170.6	9,927.4	11,269.9	10,453.2
Total Liabilities + Reserves & Surplus	**Rs. Crs**	**22,447.2**	**28,305.9**	**33,738.7**	**39,550.3**

Balance Sheet Projections for TSDISCOMS - No Grants Scenario

Balance sheet	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Assets					
Current assets					
Inventories	Rs. Crs	265.2	265.2	265.2	265.2
Trade receivables	Rs. Crs	2,023.6	2,023.6	2,023.6	2,023.6
Cash and Bank Balances	Rs. Crs	836.7	863.4	952.1	4,523.3
Short-term loans and advances	Rs. Crs	643.6	643.6	643.6	643.6
Other current assets	Rs. Crs	2,251.6	2,251.6	2,251.6	2,251.6
Total current Assets	**Rs.Crs**	**6,020.7**	**6,047.5**	**6,136.1**	**9,707.3**
Non-Current Assets					
Fixed Assets					
Gross Fixed Assets	Rs. Crs	17,974.5	24,992.3	30,757.7	35,934.6
Less: Depreciation	Rs. Crs	6,869.3	8,107.9	9,668.2	11,501.5
Capital work in progress	Rs. Crs	3,575.3	3,091.2	2,579.0	2,528.1
Intangible assets	Rs. Crs	10.7	10.7	10.7	10.7
Investments	Rs. Crs	418.1	423.7	429.8	436.4
Long term loans and advances	Rs. Crs	81.6	81.6	81.6	81.6
Other non-current assets	Rs. Crs	12.8	12.8	12.8	12.8
Total Fixed Assets	**Rs. Crs**	**15,203.7**	**20,504.4**	**24,203.5**	**27,502.7**
Total Assets	**Rs. Crs**	**21,224.5**	**26,551.9**	**30,339.6**	**37,210.0**
Liabilities					
Short-term borrowings	Rs. Crs	2,684.0	2,684.0	2,684.0	2,684.0
Trade payables	Rs. Crs	5,560.0	5,560.0	5,560.0	5,560.0
Other current liabilities	Rs. Crs	1,876.1	2,206.5	2,635.1	3,202.4
Short-term provisions	Rs. Crs	84.0	84.0	84.0	84.0
Working capital borrowings	Rs. Crs	175.9	212.4	252.4	294.6
Cash Deficit Loan	Rs. Crs	377.9	2,128.2	3,306.1	9,743.3
Long term loans	Rs. Crs	16,193.5	19,126.2	20,855.9	22,272.3
Other long term liabilities	Rs. Crs	1,269.8	1,941.3	3,348.3	5,337.2
Long term provisions	Rs. Crs	554.1	554.1	554.1	554.1
Payment due on Capital liabilities	Rs. Crs	-	-	-	-
Defferred tax liability	Rs. Crs	(226.6)	(226.6)	(226.6)	(226.6)
Total Liabilities	**Rs. Crs**	**28,548.6**	**34,270.0**	**39,053.2**	**49,505.4**
Share Capital	Rs. Crs	4,428.9	7,816.7	10,820.3	12,268.1
Reserves and Reserve funds	Rs. Crs	(11,753.0)	(15,534.8)	(19,533.9)	(24,563.5)
Total	Rs. Crs	(7,324.1)	(7,718.1)	(8,713.6)	(12,295.4)
Total Liabilities + Reserves & Surplus	**Rs. Crs**	**21,224.5**	**26,551.9**	**30,339.6**	**37,210.0**

Balance Sheet Projections - 1% increment in AT&C Loss Trajectory

Balance sheet	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Assets					
Current assets					
Inventories	Rs. Crs	265.2	265.2	265.2	265.2
Trade receivables	Rs. Crs	2,023.6	2,023.6	2,023.6	2,023.6
Cash and Bank Balances	Rs. Crs	742.6	660.8	625.9	4,058.3
Short-term loans and advances	Rs. Crs	643.6	643.6	643.6	643.6
Other current assets	Rs. Crs	2,251.6	2,251.6	2,251.6	2,251.6
Total current Assets	**Rs.Crs**	**5,926.7**	**5,844.8**	**5,810.0**	**9,242.3**
Non-Current Assets					
Fixed Assets					
Gross Fixed Assets	Rs. Crs	17,974.5	24,992.3	30,757.7	35,934.6
Less: Depreciation	Rs. Crs	6,860.4	8,067.3	9,571.0	11,325.9
Capital work in progress	Rs. Crs	3,575.3	3,091.2	2,579.0	2,528.1
Intangible assets	Rs. Crs	10.7	10.7	10.7	10.7
Investments	Rs. Crs	418.1	423.7	429.8	436.4
Long term loans and advances	Rs. Crs	81.6	81.6	81.6	81.6
Other non-current assets	Rs. Crs	12.8	12.8	12.8	12.8
Total Fixed Assets	**Rs. Crs**	**15,212.6**	**20,545.0**	**24,300.6**	**27,678.3**
Total Assets	**Rs. Crs**	**21,139.3**	**26,389.8**	**30,110.6**	**36,920.7**
Liabilities					
Short-term borrowings	Rs. Crs	2,684.0	2,684.0	2,684.0	2,684.0
Trade payables	Rs. Crs	5,560.0	5,560.0	5,560.0	5,560.0
Other current liabilities	Rs. Crs	1,876.1	2,206.3	2,632.8	3,195.1
Short-term provisions	Rs. Crs	84.0	84.0	84.0	84.0
Working capital borrowings	Rs. Crs	175.9	212.4	252.4	294.6
Cash Deficit Loan	Rs. Crs	656.3	2,707.0	4,161.3	10,795.1
Long term loans	Rs. Crs	15,970.8	18,572.4	20,082.9	21,302.0
Other long term liabilities	Rs. Crs	1,280.7	1,952.2	3,359.2	5,348.1
Long term provisions	Rs. Crs	554.1	554.1	554.1	554.1
Payment due on Capital liabilities	Rs. Crs	-	-	-	-
Defferred tax liability	Rs. Crs	(226.6)	(226.6)	(226.6)	(226.6)
Total Liabilities	**Rs. Crs**	**28,615.2**	**34,305.7**	**39,144.1**	**49,590.4**
Share Capital	Rs. Crs	4,328.4	7,556.8	10,436.5	11,760.4
Reserves and Reserve funds	Rs. Crs	(11,804.3)	(15,472.7)	(19,470.0)	(24,430.2)
Total	Rs. Crs	(7,475.9)	(7,915.9)	(9,033.4)	(12,669.7)
Total Liabilities + Reserves & Surplus	**Rs. Crs**	**21,139.3**	**26,389.8**	**30,110.6**	**36,920.6**

Balance Sheet Projections – Nil Accumulated Losses Scenario

Balance sheet	UoM	FY 15-16	FY 16-17	FY 17-18	FY 18-19
Assets					
Current assets					
Inventories	Rs. Crs	265.2	265.2	265.2	265.2
Trade receivables	Rs. Crs	2,023.6	2,023.6	2,023.6	2,023.6
Cash and Bank Balances	Rs. Crs	2,050.5	2,576.8	4,254.0	6,688.0
Short-term loans and advances	Rs. Crs	643.6	643.6	643.6	643.6
Other current assets	Rs. Crs	2,251.6	2,251.6	2,251.6	2,251.6
Total current Assets	**Rs.Crs**	**7,234.6**	**7,760.9**	**9,438.0**	**11,872.0**
Non-Current Assets					
Fixed Assets					
Gross Fixed Assets	Rs. Crs	17,974.5	24,992.3	30,757.7	35,934.6
Less: Depreciation	Rs. Crs	6,860.4	8,067.3	9,571.0	11,325.9
Capital work in progress	Rs. Crs	3,575.3	3,091.2	2,579.0	2,528.1
Intangible assets	Rs. Crs	10.7	10.7	10.7	10.7
Investments	Rs. Crs	418.1	423.7	429.8	436.4
Long term loans and advances	Rs. Crs	81.6	81.6	81.6	81.6
Other non-current assets	Rs. Crs	12.8	12.8	12.8	12.8
Total Fixed Assets	**Rs. Crs**	**15,212.6**	**20,545.0**	**24,300.6**	**27,678.3**
Total Assets	**Rs. Crs**	**22,447.2**	**28,305.9**	**33,738.7**	**39,550.3**
Liabilities					
Short-term borrowings	Rs. Crs	-	-	-	-
Trade payables	Rs. Crs	5,560.0	5,560.0	5,560.0	5,560.0
Other current liabilities	Rs. Crs	1,876.1	2,206.5	2,635.1	3,202.4
Short-term provisions	Rs. Crs	84.0	84.0	84.0	84.0
Working capital borrowings	Rs. Crs	175.9	212.4	252.4	294.6
Cash Deficit Loan	Rs. Crs	-	-	-	2,121.4
Long term loans	Rs. Crs	4,983.4	8,046.8	10,261.5	12,170.0
Other long term liabilities	Rs. Crs	1,269.8	1,941.3	3,348.3	5,337.2
Long term provisions	Rs. Crs	554.1	554.1	554.1	554.1
Payment due on Capital liabilities	Rs. Crs	-	-	-	-
Defferred tax liability	Rs. Crs	(226.6)	(226.6)	(226.6)	(226.6)
Total Liabilities	**Rs. Crs**	**14,276.6**	**18,378.4**	**22,468.8**	**29,097.1**
Share Capital	Rs. Crs	4,328.4	7,556.8	10,436.5	11,760.4
Reserves and Reserve funds	Rs. Crs	3,842.2	2,370.6	833.3	(1,307.2)
Total	Rs. Crs	8,170.6	9,927.4	11,269.9	10,453.2
Total Liabilities + Reserves & Surplus	**Rs. Crs**	**22,447.2**	**28,305.9**	**33,738.7**	**39,550.3**

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