
24X7 POWER FOR ALL

A JOINT INITIATIVE OF GOVERNMENT OF INDIA
AND GOVERNMENT OF PUNJAB



FEBRUARY 2016



Government of India



Piyush Goyal

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

Foreword

Electricity consumption is one of the most important indicators that decides the development level of a nation. The Government of India is committed to improve 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.

Punjab is one of the high per capita electricity consumption states in the country and is also one of the states which has achieved 100% electrification a long time back. However, the State has to make time bound programme to complete the identified works for improving the quality and reliability of power supply in all the areas. Also optimum utilization of State generation assets and optimization of power purchase cost may be focused upon to provide affordable power supply in the State.

This joint initiative of Government of India and Government of Punjab aims to enhance the satisfaction levels of the consumers and improve the quality of life of people through 24x7 power supply at affordable cost. This would lead to rapid economic development of the state in primary, secondary & tertiary sectors resulting in inclusive development.

I compliment the Government of Punjab and wish them all the best for implementation of this programme. The Government of India will complement the efforts of Government of Punjab State 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.



Government of Punjab



Parkash Singh Badal

Chief Minister of Punjab

Foreword

Power sector is a critical infrastructure element required for the smooth functioning of the economy. An efficient, resilient and financially sustainable power sector is essential to stimulate growth and prosperity in the state. The availability of reliable, quality and affordable power can ensure growth of all sectors of economy including agricultural, industrial and others.

Punjab is a prosperous state with 100% electrification. However, there is need for strengthening the system coupled with the need to supply affordable power to all and also keep the power companies in pink of financial health. AT & C loss reduction and application of energy efficiency measures would go a long way in achieving these objectives.

It is at this juncture that “**24x7 Power for all**” programme plays a pivotal role. Conceived with the objective of providing 24x7 quality, reliable and affordable power for all, this programme takes a holistic approach for addressing the concerns across the value chain in Power sector.

On behalf of Government of Punjab, I would like to thank Government of India, Hon'ble Prime Minister and Hon'ble Minister of Power for initiating this programme.



Government of Punjab



Sardar Sukhbir Singh Badal

Deputy Chief Minister of Punjab

Foreword

The State of Punjab has already achieved 100% electrification and adequate supply of power is ensured to all the power consuming sectors. The implementation of roadmap laid down in the “**24x7 Power for All**” document would usher an era of recommitting itself to ensure quality, reliable and affordable power to people of State. It would also pave the way for better power planning encompassing power procurement plan, utilization of existing capacities and better management of surplus energy with the State.

On behalf of people of Punjab and State Government, I am thankful to Government of India and all concerned involved in the shaping up of this document and assure best possible endeavors by state towards implementation of roadmap laid down in the document.

I also express my gratitude to Hon'ble Prime Minister and Hon'ble Minister of Power for initiating this programme aimed at ensuring 24x7 Power for All by Year 2019.



Government of India



Government of Punjab

Joint Statement

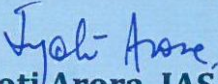
The State of Punjab is committed to provide quality life to people of state. Electricity supply serves as an important means to achieve this. The programme of “24x7 power for all” is an important step in this direction and this programme will be implemented by Government of Punjab (GoP) with the objective to ensure supply of quality, reliable and affordable power to all category of consumers on 24x7x365 basis.

Government of Punjab 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 renewable, demand side management & energy efficiency measures, undertaking customer centric initiatives, reduction of AT & C losses, bridging the gap between ACS & ARR, finding out cost effective solutions for wider seasonal variation in demand, economical disposal of surplus power with the state and following good governance practices in implementation of all central and state government schemes.

Government of India (GoI) would supplement the efforts of Government of Punjab by fast tracking resolution of key issues pertaining to generation, expediting the additional interstate connectivity and ensuring optimum allocations in various distribution schemes, as per the provisions of applicable policies.

Government of Punjab would endeavour to implement the programme within the targeted time frame of FY 2018-19 or even earlier than the targeted date.

The central and state governments would meet regularly to review the progress of the programme over the next three (3) years and would strive to achieve the objectives of the programme by taking the necessary steps as envisaged in the PFA document.


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



A. Venu Prasad, IAS
Secretary/Power
Government of Punjab (GoP)

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TRANSMISSION MAP OF PUNJAB 132 KV & ABOVE AS ON 31-3-2015

INTRA STATE 400kV GRID NETWORK WITH DISTANCE



EXECUTIVE SUMMARY

24x7 Power for All (24x7 PFA) is a Joint initiative of Government of India (GoI) and State Governments with the objective to ensure availability of 24x7 power supply to all households, industries, commercial businesses, public needs & any other electricity consuming entity and adequate power to agriculture consumers by FY 2018-19 as per the state policy.

This roadmap document aims to meet the above objectives for the state of Punjab. Punjab has approx. 3.26% of total installed capacity in the country and the state has already achieved 100% village electrification long time back. As per State Govt. there is no un-electrified household in the State as on date. 24 Hrs supply is being provided in rural and urban areas in the State. However, the supply to agricultural is being given for 6-8 Hrs per day. The per capita consumption of power in Punjab was 1858 units during 2014-15 which is much higher than the present National average of 1010 units during FY 2014-15.

GROWTH IN DEMAND

As per the power supply position in the State, Punjab has about 12% peak power shortage and less than 2% energy shortage during FY 2013-14 and FY 2014-15.

In order to achieve the objective of 24 x 7 power supply to All, the state would see an increase in peak demand from 11,534MW at present (FY 2014-15) to 13,399MW in FY 2018-19 with corresponding increase in energy requirement from 48864 MU in FY 2014-15 to 66,483 MU in FY 2018-19.

The future demand has been derived by estimating the urban and rural household consumption taking into account the growth in number of electrified households on the one hand and the growth in average consumption per household on the other. The combined growth rate based on five (5) years CAGR (from FY 2010-11 to FY 2014-15) and keeping in view the future growth potential of Industrial and Commercial activities, average CAGR of 7.5% p.a. has been adopted to project consumption of "other than domestic category" consumers.

SUPPLY ADEQUACY

The available capacity (installed as well as allocated share) for the State as on 31st March 2015 was 10955.21 MW. In order to meet the estimated increased demand for providing 24x7 power supply in the state, the state has already planned additional capacity availability of 6831 MW by FY 2018-19 through own generating stations, renewable energy sources, central generating stations and long term/medium term PPAs in a phased manner. Out of this, 2786.3 MW shall be added through non-conventional energy sources (PEDA & NRSE) and balance 4044.8 MW through conventional sources.

Even with the availability of additional capacity, the state will still be facing a shortfall of about 3.76% during FY 2015-16 in terms of peak demand which is likely to increase to 8.94% during FY 2018-19. However, during the same period the state shall have surplus availability of energy ranging from 48.72% to 36.79%.

It is worth mentioning that Punjab State has a typical demand variation between paddy season (from June to September) and rest of the year. During paddy season, the demand touches its maximum but reduces to less than half during rest of the year. The situation becomes further aggravated due to less industrial load in the state which otherwise would have provided steady load and stabilizing effect on the load curve of the state. .

In order to mitigate the situation, the State will have to progressively plan to tie up additional power on short/medium/Long term basis only for peaking power. Considering the uniqueness of the situation, the state will have to plan procurement of power in a measured way so that peak demand is met while surplus in energy availability is minimized i.e. with right kind of generation mix (i.e. with proper Thermal : Hydro ratio), by giving more preference to the Hydro projects. Government of Punjab may also arrange additional power during paddy seasons through banking of power with other states having different seasonal load pattern. At the same time, the deficit in peak demand can also be effectively reduced through proper implementation of DSM & Energy efficiency



measures in the state. Further, during the periods when surplus energy is available, the state is required to firm up plan for export of surplus energy to those states which face power deficit during that period and in turn, the State of Punjab may earn revenue.

The State is executing two hydro projects of capacity 206 MW at Shahpur Kandi and 18 MW at Mukerian respectively. Timely execution of these projects will help the state in mitigating peak shortage problem to some extent.

Adequacy of Transmission Network

The state is well served by a network of Inter-state transmission lines at 400kV & 220kV levels and the existing ISTS transmission system capacity is adequate for meeting the present power requirement.

In ISTS system, Power Grid (PGCIL) and Punjab State Transmission Corporation Ltd (PSTCL) have undertaken/planned a number of transmission works for further strengthening & augmenting the capacity and for better connectivity of Punjab State Grid with National Grid. The present combined existing transmission capacity at 400kV level is 9920 MVA and the same shall be increased to 13670 MVA by FY 2018-19. Keeping in view the power evacuation of about 4936 MW at 220 KV and below level within the state, the capacity addition plan as envisaged is adequate to meet the projected power demand of 13399 MW by FY 2018-19.

The combined total existing Intra state transmission capacity at 220 kV & 132 kV level is 28399 MVA in the state which can comfortably cater to the maximum demand of 11534 MW of the state during FY 2014-15. The same shall be increased to 34729 MVA which would be adequate to take care of maximum power demand of 13399 MW of the state by FY 2018-19 to cater 24x7 PFA requirements.

The capacity addition in intra-state transmission system has been planned with an investment of 1325 Crores from FY 2015-16 to FY 2018-19 to meet the requirement of 24x7 PFA requirement.

ADEQUACY OF DISTRIBUTION NETWORK

The state is already providing 24 Hrs supply in rural and urban areas. However, agricultural supply is being provided for 6-8 Hrs per day in the state as per the requirement. The State has already carried out feeder segregation to provide regulated supply to the agriculture sector. Distribution sector in the state is being augmented through RAPDRP/ RGGVY schemes of GoI and other state schemes. R-APDRP, Part-A is under implementation in 47 Towns with total outlay of Rs. 272 Crores. The total approved cost of Part-B scheme is Rs. 1632.73 Crores for 46 towns in Punjab. 24 towns are under implementation and are to be completed shortly. The process of re-tendering in the remaining 22 towns is in progress.

Under RGGVY XIth plan scheme, 17 projects at an estimated cost of Rs 186.91 Crores were sanctioned for intensive electrification of 6297 villages and providing free electricity connections to 92988 BPL HHs for Punjab. All the works have already been completed in the state. Under DDUGJY Scheme, Government of India has approved the projects worth Rs. 252.06 Crores for the state of Punjab which include the cost of system strengthening, metering and feeder segregation etc. However, state had submitted as NAD of Rs 981 Crores under DDUGJY. Recently, under IPDS Scheme, GOI has approved the projects worth Rs. 324.0 Crores covering augmentation of sub-transmission and distribution network in 102 towns in the state of Punjab. Keeping in view the existing & proposed capacities at sub-transmission and distribution level, the system would be adequate to meet the projected load of the state by FY 2018-19.

AT&C losses in the state are targeted to be decreased to 15% in FY 2018- 19 from 16.66% in FY 2014-15 as per loss trajectory committed to MoP by the state. As per State, the above loss is also inclusive of Intra State Transmission loss which is about 2.5% as per PSERC tariff order.



FINANCIAL POSITION

After unbundling of the erstwhile Punjab State Electricity Board (PSEB) in April 2010, PSPCL incurred loss of Rs. 1639.76 Crores in the first year of operation i.e. FY 2010-11, which decreased to Rs. 537 Crore in 2011-12. However, PSPCL has made profit of Rs. 261

Crores and Rs. 256 Crores (provisional) in the year 2012-13 and 2013-14 respectively. Accumulated losses as on 31.03.2014 is Rs. 1660 Crores. Revenue from sale of power has increased from Rs. 13966 Crores in FY 2012-13 to Rs. 16235 Crores (provisional) in FY 2013-14. However, the State has to take several measures to turn around in profitable mode by FY 2018-19.



Providing access to electricity on 24X7 basis for all its citizens has become synonymous to cause of social and economical upliftment for states. It means much more than merely an act of infrastructure development and thus this issue has acquired significant dominance on the national as well as state agenda. Endeavour to perk-up the growth in electricity consumption to stand in pace with national/global benchmark, therefore, are to be taken up with top most priority.

Under the Indian Constitution, electricity is a concurrent subject and distribution of electricity falls under the purview of the respective State Government/State Power Utility. As per Electricity Act 2003, it is the duty of a distribution licensee to develop and maintain an efficient, co-ordinated and economical distribution system in his area of supply and to supply electricity in accordance with the provisions contained in the Act. The State Electricity Regulatory Commission (SERC) have to specify and enforce standards with respect to quality, continuity and reliability of service by licensees. Accordingly, State Electricity Regulatory Commissions (SERCs) have notified the Standards of Performance specifying maximum allowable time for restoration of supply due to forced breakdowns and Supply Code specifying the supply voltages & frequency etc, to be followed by Discoms. SERCs also monitor the performance of distribution companies on the basis of notified Performance of Standards.

OBJECTIVES OF THE 24X7 POWER FOR ALL – JOINT INITIATIVE

To supplement the efforts of state towards achieving these objectives, Government of India and Government of Punjab have taken a joint initiative to provide 24 X 7 power in the state to all consumers. The hours of adequate supply to agriculture consumers will be decided by the state Government. This initiatives aims at ensuring uninterrupted supply of quality and reliable power to existing consumers and providing access to electricity to all upcoming new consumers in future.

The initiative of 24x7 Power supply to all encompasses mainly the following:

- i. To provide reliable & quality 24X7 power supply to the existing consumers in a phased manner within a period of three years from the date of commencement of the programme.
- ii. All unconnected households if any, to be provided access to electricity in a time bound manner ultimately by 2019 and all upcoming households in future also to be provided access to electricity.
- iii. To ensure adequate capacity addition planning & tie ups for power from various sources at affordable price to meet the projected increase in power demand for future.
- iv. To strengthen the Transmission and Distribution network to cater to the expected growth in demand of existing as well as forthcoming consumers.
- v. Monitoring the timely commissioning of various generating plants, transmission and distribution infrastructure to meet the expected growth in demand.
- vi. To put in place a strategy to ensure reduction of AT&C losses as per the agreed loss reduction trajectory and methodology & steps required to be taken at every level of distribution.
- vii. Overall Power Supply Improvement – To be achieved by undertaking measures such as energy mix optimization, reduction in operational in-efficiency of state generation plant(s) and optimal fuel procurement policy.
- viii. To take financial measures including investment rollout plans and undertaking necessary balance sheet analysis to assess the financial strength/ weaknesses in the utility finances.



- ix. To introduce modern technologies to monitor reliability of supply like sub-station automation, providing adequate communication infrastructure, GIS, Reliability, Centralised Network Analysis and Planning tools, SAP driven ERP systems, DMS (Distribution Management Systems), OMS (Outage Management System), etc.
- x. To take essential measures for meeting the performance standards as laid down by SERC.

An Action plan would be 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. This joint initiative of Government of India and Government of Punjab aims to enhance the satisfaction levels of consumers, improve the quality of life of people, and increase the economic activities resulting into inclusive development of the state.

METHODOLOGY FOR PREPARATION OF THE ACTION PLAN FOR THE 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) Projection of demand of consumers encompassing commercial, industrial, agricultural and remaining categories put together as others category based on past data and historical CAGR recorded for these categories of consumers in the state during the past years after discussing with state & factoring in the aspirational growth perspective.
- 3) Project the annual energy requirement and maximum demand by aggregating the requirement of all consumer categories and applying an appropriate load factor.
- 4) Prepare a broad plan to meet power demand in future through additional generation capacity proposed in the state and quantum for additional procurement required.
- 5) Assess the financial implications on utilities and per unit implication on tariff for procuring additional energy to meet the energy requirement of all segments of consumers. 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.
- 6) Conduct sensitivity analysis on various parameters namely average tariff, AT&C loss reduction, etc.
- 7) Set monitorable targets to achieve the goal of 24x7 PFA in a cost effective manner to the consumers of the State.



CHAPTER – 2: FACTS ABOUT PUNJAB



Punjab is the 19th largest state in terms of area, (area of 50362 km²) and the 15th largest by population (as per census 2011) with total population of 277.04 lakhs (146.35 lakhs male and 130.69 lakhs female). The five rivers Sutlej, Beas, Ravi, Chenab and Jhelum gave it its name 'Punjab' or the 'land of five rivers'.

Punjab is one of the most prosperous states in India and its per capita income is twice the national average. Punjab has good infrastructure facilities among Indian States which includes road, rail, air and river transport links etc. throughout the region.

The brief profile of the Punjab state is as follows:

Table-2.1

Brief Profile of Punjab

Sl. No.	Description	
1	Area (Sq. Km.)	50,362
2	Population (Persons as per 2011 census)	
	- Rural	17344192
	- Urban	10399146
3	Per Capita income (in Rs.)	46688*
4	No. of Districts	22
5	State GDP growth rate (FY 2013-14)	11.26%**
6	Total electrified household- (FY 2014-15)(Rural)	3363099
7	Total electrified household- (FY 2014-15)(Urban)	2643691

*www.pbplanning.gov.in

**Wikipedia

Punjab power establishments have been a forerunner in terms of growth. On the one hand, state boasts to have surplus electricity which is generated and distributed by state-owned Punjab State Power Corporation Limited (PSPCL) and transmitted by Punjab State Transmission Corporation Limited (PSTCL). On the other hand, it suffers from inability to sell surplus power at compensatory rates in the market. Punjab has approx. 3.26% of total installed capacity in the country. The per capita consumption of power in Punjab was 1858 units during FY 2014-15 which was much higher than the National Average of 1010 units observed during FY 2014-15.

Punjab has observed 11.96% peak shortage and around 1% energy shortage during FY 2014-15. The State has achieved 100% electrification long time back and as per the state data, there are no un-electrified household in the state as on date. The state is providing 24 hr power supply to all consumers except agriculture which is being supplied 6-8 hrs. Power as per the requirement.

CHAPTER – 3: CONSUMPTION PATTERN AND ELECTRIFICATION STATUS

As per Census 2011 data, there were about 54.1 lakhs households in the state, out of which 33.2 lakhs were in rural areas and balance 20.9 lakhs were in urban areas. Out of 33.2 lakhs rural households, 31.7 lakhs (95.5 %) were electrified and balance 1.5 lakhs (4.5 %) were un-electrified as per census data. In urban areas, out of total of 20.9 lakhs households, 20.6 lakhs (98.3 %) were electrified and balance 0.3 lakhs (1.7 %) were un-electrified thus having around 96.6% electrified households in the state. The details as per census 2011 are as under-

Description	Rural No.	Urban No.	Total No.
No. of Households	3315632 (61.29%)	2094067 (38.71%)	5409699 (100%)

Description	Rural No.	Urban No.	Total No.
No. of Electrified Households	3166394	2059399	5225793 (96.60%)
Balance Un-electrified Households	149238	34668	183906 (3.40%)

The projection of total number of households to FY 2014-15 has been carried out based on census figures of 2011 and considering CAGR of the past 10 years. However, the arrived figures have also been compared with state data and the latest data as provided by the state has been considered for projecting the future household consumption. As per the State, there is no un-electrified household in the state as on date.

The details of households in the State of Punjab based on Census figures and as per GoP are as under:

Table-3.1

No. of Households in Punjab in FY 2014-15

Particulars	Census 2001	Census 2011	CAGR	As projected from Census figures	As per State Data	Finally Adopted data
Total Households	4265156	5409699	2.41%	5959722	6006790	6006790
Rural Households	2775462	3315632	1.79%	3560072	3363099	3363099
Urban Households	1489694	2094067	3.46%	2399650	2643691	2643691
Total Electrified Households	3920301	5225793	2.92%	5862533	6006790	6006790
Rural Electrified H/H	2482925	3166394	2.46%	3489840	3363099	3363099
Urban Electrified H/H	1437376	2059399	3.66%	2377982	2643691	2643691
Total Un-electrified H/H	344855	183906	-6.09%	143420	0	0
Rural Un-electrified H/H	292537	149238	-6.51%	114014	0	0
Urban Un-electrified H/H	52318	34668	-4.03%	29406	0	0

At present, out of the total consumption in the state, domestic category of consumers consumes about 27.57%, industrial 33.16% and agricultural around 26.34%. The category wise growth in consumers from FY 2009-10 to FY 2014-15 is furnished in Annexure-I.

Load Projection

Based on the urban & rural consumption data provided by state, present per household per day consumption has been assessed as 4.03 units/day in rural area and 6.42 units/day in urban area as shown in Table-3.2.



Table-3.2**ESTIMATION OF EXISTING PER HOUSEHOLD CONSUMPTION**

Sl. No.	Particulars	Unit	As per State data (FY 2014-2015)
1	Total Households in State	Nos.	6006790
2	Total Urban Households	Nos.	2643691
3	Total Rural Households	Nos.	3363099
4	Total Electrified Households	Nos.	6006790
5	Total Electrified Households - Urban	Nos.	2643691
6	Total Electrified Households - Rural	Nos.	3363099
7	Balance Un-electrified Households	Nos.	0
8	Balance Un-electrified Households - Urban	Nos.	0
9	Balance Un-electrified Households - Rural	Nos.	0
10	Electrification of houses under 12th Plan RGGVY	Nos.	0
11	Annual energy sold in the State during FY 2014-15	MU	40403
12	Annual Domestic energy sold in the state during FY 2014-15	%	27.57
13	Annual Domestic energy sold in the State during FY 2014-15	MU	11138
14	Average Annual Energy Consumption per household during FY 2014-15	kWh	1854
15	Average Daily Energy Consumption per household during FY2014-15	kWh	5.08
16	Annual Total Rural Consumption	MU	4942
17	Annual per household rural consumption	kWh	1470
18	Annual Total Urban Consumption	MU	6195
19	Annual per Household Urban Consumption	kWh	2343
20	Daily per household rural consumption	kWh	4.03
21	Daily per household Urban consumption	kWh	6.42

The daily per household Rural and Urban consumption as worked out above has been considered for projection of Annual energy requirement in the state from FY 2015-16 to FY 2018-19.

CHAPTER – 4: DEMAND AND SUPPLY SCENARIO

The Power Supply Scenario in Punjab (as per state data) from the FY 2008-09 to FY 2014-15 is as under-

Table-4.1

Power Supply Scenario

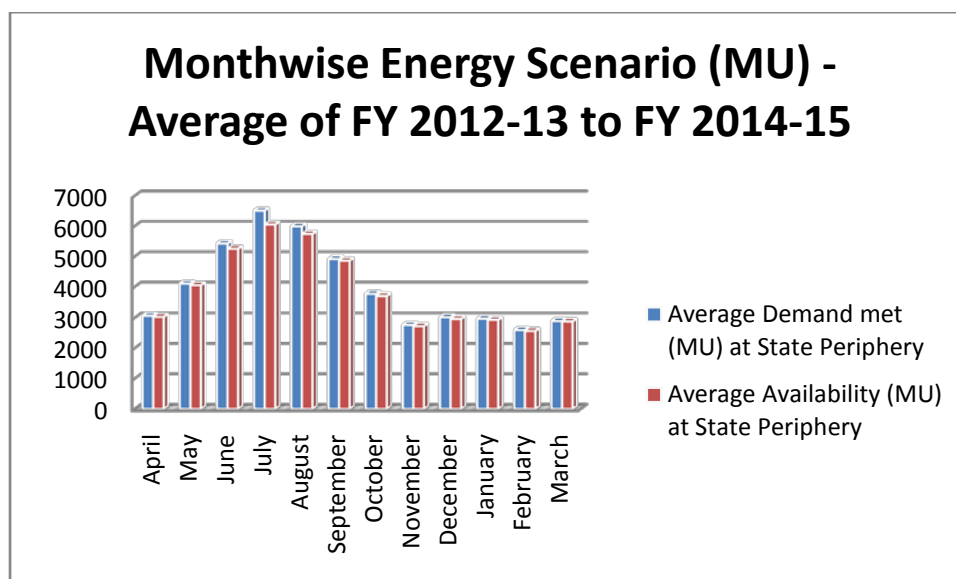
Period/Items	Unit	FY 2009-10	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14	FY 2014-15
Peak Demand at state periphery	MW	9786	9399	10471	11520	10141	11534
Peak Met	MW	7407	8007	8834	9074	8903	10155
Peak Deficit (-)/ Surplus (+)	MW	-2379	-1392	-1637	-2446	-1238	-1379
Peak Deficit (-)/ Surplus (+)	%	-24.3	-14.8	-15.6	-21.2	-12.2	-11.96
Energy Requirement at state periphery	MU	46426	45249	46264	47996	47347	48864
Energy Availability at state periphery	MU	39977	42513	44824	45389	46610	48380
Energy Deficit (-)/ Surplus (+)	MU	-6449	-2736	-1440	-2607	-737	-484
Energy Deficit (-)/ Surplus (+)	%	-13.9	-6.0	-3.1	-5.4	-1.6	-1.0

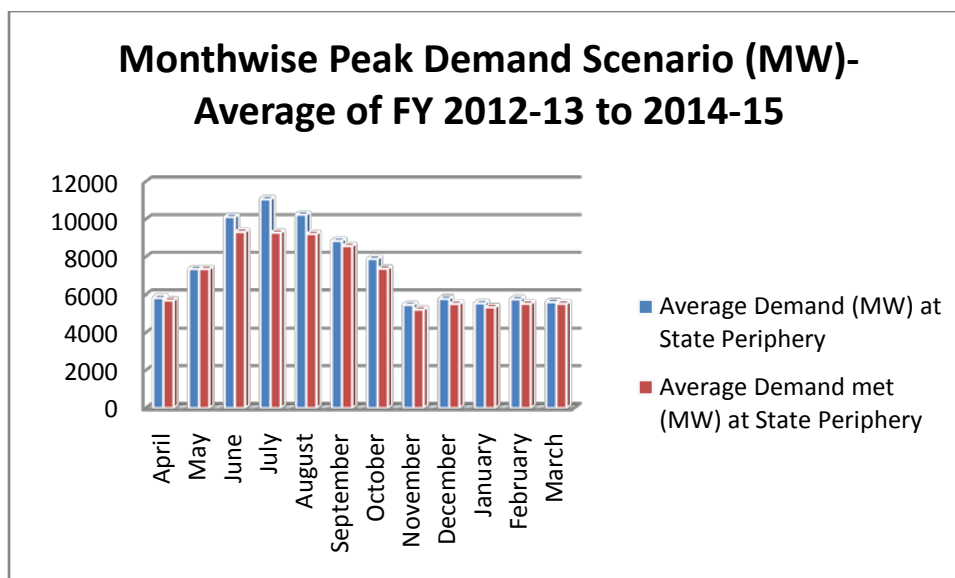
Source: State Power Utilities/CEA

It may be seen that the average energy shortage in the state is in the range of around 1% while peaking shortage is about 12% in the state as observed during FY 2014-15. In order to have an insight of typical seasonal demand availability pattern of Punjab, month wise demand availability scenario has also been analyzed. The

paddy season led demand surge and its subsequent decline in rest of the months of year based on average figures for FY 2012-13 to FY 2014-15 has been graphically represented as hereunder:

Month-wise load pattern- Punjab





It can be visualized from the above that during months of June to September, the demand remains very high although availability also improves during these months.

The base year for the purpose of beginning the future assessment has been considered as FY 2014-15 which has an aggregated demand of 48.9 Billion Unit (BU).

Demand Estimation Methodology

For the purpose of demand estimation, power consumers have been broadly classified into the domestic consumers and others (commercial, industrial, agriculture etc.). The demand projection has been done taking into account the demand for 24X7 power supply under following heads:

- Demand growth to a targeted value for already electrified households (both Urban and Rural).
- Demand arising from electrification of newly constructed Household (both Urban and Rural).
- Demand on account of consumers other than domestic consumers including agricultural consumers.

The assumptions for projection of demand under different categories are described below:

- Based on the urban & rural consumption data provided by GoP, present (FY 2014-15) per household consumption has been assessed as 4.03 units/day in rural areas and 6.42 units/day in urban area.
- Energy requirement for rural & urban households have been computed based on the latent demand and considering a CAGR of 10% p.a. per rural household consumption every consecutive year from the current levels of 4.03 units/day to 5.89 units/day by FY 2018-19 and a CAGR of 8% p.a. for per urban household from the current levels of 6.42 units/day to 8.73 units/day by FY 2018-19
- Demand projections for consumers other than domestic have been done in consultation with the state officials. Average 7.5% constant growth in energy requirement per annum has been taken keeping in view of the potential growth in industrial & commercial activities due to assured power availability.

PROJECTIONS OF ANNUAL ENERGY REQUIREMENT OF THE STATE

The annual energy requirement at the state periphery works out to be around 52.4 BU in FY 2015-16 which is scaling up to around 66.5 BU in FY 2018-19 after considering the following :

a) Demand of already electrified households

The annual energy consumption for existing households works out to be 15.67 BU in FY 2018-19.

b) Demand from electrification of un-electrified households

According to the state data, the state is 100% electrified. Hence nil energy requirement has been considered on account of un-electrified households.

c) Demand from electrification of newly constructed households

To account for energy requirement of new houses which are likely to be constructed

in the coming years, projection has been done considering CAGR of 3.46% (Based on census data of 2001 & 2011) on number of urban households and CAGR of 1.79% in number of rural households. The projected energy consumption of this category works out to 1.76 BU in FY 2018-19.

d) Demand on account of users other than domestic consumers.

The annual energy requirement for consumers other than domestic has been calculated after discussion with State officials assuming that such segment of consumers are expected to grow at a constant CAGR of 7.5% p.a. The energy consumption of consumers "other than domestic" works out to be 39.1 BU in FY 2018-19.

The summary of above mentioned energy calculation during the next four years is given in the table hereunder :

Table-4.2

SUMMARY OF ANNUAL ENERGY REQUIREMENT PROJECTIONS (in MU)

Sl. No.	PARTICULARS→ ↓	YEARS			
		FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
1	Annual Energy Requirement including additional energy requirement for existing electrified households	12128	13206	14382	15665
2	Annual Energy Requirement for Electrification of un-electrified Household	0	0	0	0
3	Annual Energy Requirement for newly constructed Household	330	726	1199	1763
	TOTAL DOMESTIC	12458	13932	15581	17428
4	Annual Energy Requirement including additional energy requirement - Other than Domestic Consumers (with 7.5% growth P.A.)	31460	33820	36356	39083
	GRAND TOTAL	43918	47752	51937	56511

Annual energy requirement at state periphery

The table below shows values of projected energy requirement at the state periphery

considering distribution losses and intra-state transmission loss of 2.5% for the FY 2015-16 to FY 2018-19.



Table-4.3**ANNUAL ENERGY & PEAK DEMAND REQUIREMENT AT STATE PERIPHERY**

Year	Unit	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
Energy requirement as per demand projections	MU	43918	47752	51937	56511
Distribution losses*	%	14.01%	13.50%	12.98%	12.82%
Intrastate transmission losses**	%	2.50%	2.50%	2.50%	2.50%
Energy requirement at state periphery	MU	52383	56620	61215	66483
Load Factor	%	54.84	55.04	55.84	56.64
Peak Demand at different Load Factor (LF)	MW	10904	11743	12514	13399

*As per state power utilities

**As per tariff order FY 2014-15

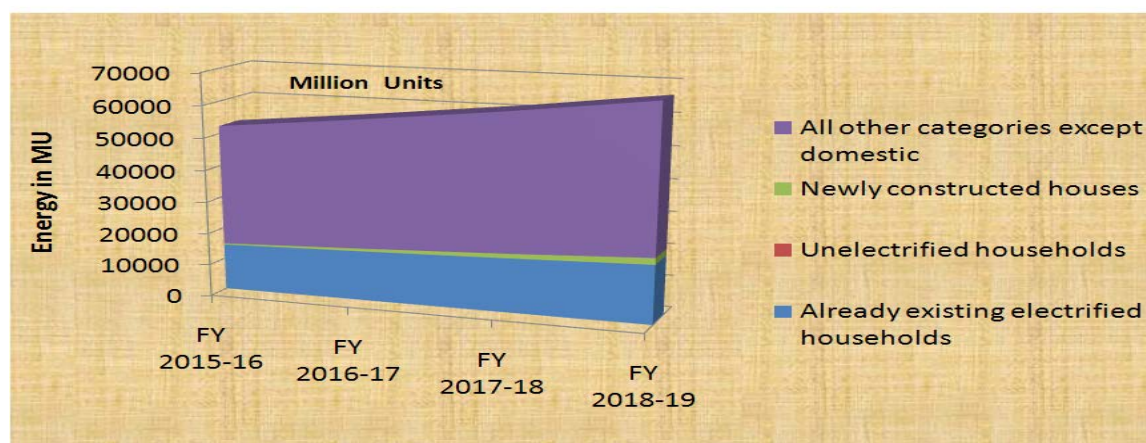
The average load factor for the state was 54.64% during FY 2014-15 based on the actual data published by CEA and thereafter the load factor has been revised in tandem with the 18th EPS report.

The detailed calculation of energy demand under different categories is given at Annexure-II.

Keeping in view the unrestricted demand, the energy requirement at consumers end is estimated as 56.5 BU which corresponds to 66.5 BU at state periphery (considering distribution losses and intra-state transmission

loss trajectory as indicated by state) for all categories of consumers by FY 2018-19. The maximum demand requirement of the state is projected to increase to around 13399 MW by FY 2018-19.

As per projections made in 18th EPS of CEA, the projected energy demand and peak load for the state of Punjab would be 76.2 BU and 13228 MW respectively in FY 2018-19 as against the now calculated energy demand of 66.5 BU and peak load of 13399 MW in FY 2018- 19.

Projected annual energy requirement at state periphery

As against energy demand of 66.5 BU in FY 2018-19 at the state periphery, the energy availability projections from all possible sources as per State Plan by FY 2018-19 works out to 91.2 BU (shown in next chapter) indicating a surplus of 24.7 BU.

The adoption of various energy efficiency measures like energy efficient agricultural/irrigation pump-sets, energy efficient lighting (use of LEDs), adopting demand side management initiatives like introduction of

Time of Day (TOD) tariff etc., or by adopting accelerated AT & C loss reduction targets would help in reducing the peak demand and energy requirement of the state in the coming years.

However, detailed assessment of the adequacy of Generation, Transmission and Distribution

infrastructure required to meet the projected demand by FY 2018-19 has been made based on the demand in the subsequent chapters.

The generation plan will ensure adequate capacity addition planning & tie ups for power from various sources at affordable price to meet the projected increase in power demand for future. The generation plan includes:

- Existing Generation
- Future Generation Plans (Projects under construction and future projects)
- Generation capacity required to meet Peak Demand
- Power procurement costs
- Fuel Requirement
 - Coal requirement based on linkage with CIL
 - Coal Imports to meet shortfall of Coal
 - Issues regarding coal procurement plan
 - Coal requirement based on coal blocks allotted for ongoing projects
 - Allocation of coal linkage/coal blocks for future power projects
- Issues related to fuels other than coal
- Hydel Power Issues
- Year-wise capacity addition plan from renewable source (separately for Solar, Biomass, etc.)

- Action plan of the state
- Fund Requirements
- Gol/ State Govt. Interventions

Existing Generation Capacity / Availability of Power (As on 31.03.15)

Total generation capacity / availability of power as on 31.03.2015 for the state of Punjab is 10955.21 MW. Out of total 10955.21MW, about 61.47 % is from Coal based Thermal, about 3.66 % is from Gas based Thermal, about 1.8 % is from Nuclear, about 28.65 % is from Hydro & state NRSE Hydro and balance 5.32 % is from Renewable Energy Sources.

In terms of ownership, the share of State Sector has the largest share of 37.65%, followed by share of Central Sector Allocation which is 32.95%. The share of Private Sector / IPPs is 18.80% and Bhakhra Beas Management Board (BBMB) contributes the balance 10.60 %. The details of existing generating capacity available for the state of Punjab are shown at in Table 5.1 below :

Table-5.1

Existing Generation Capacity / Availability of Power (As on 31.03.15)

Ownership / Sector	MODE WISE BREAK UP (MW)							Grand Total (MW)
	Thermal				Nuclear	Hydro & NRSE	RES & NRSE (MNRE)	
	Coal	Gas	Diesel	Total				
STATE	2640	0	0	2640	0	1000.35	484.00	4124.35
PRIVATE/IPPs	2060	0	0	2060	0	0	0	2060
CENTRAL	2034.18	401.06	0	2435.24	196.80	977.54	0	3609.58
BBMB	0	0	0	0	0	1161.28	0	1161.28
TOTAL	6734.18	401.06	0	7135.24	196.80	3139.17	484.00	10955.21

Source: State Power Utilities

Future plan for augmentation of generation capacity / availability of power:

As per generation plan of State of Punjab, capacity of around 6831.1 MW is expected to be added by FY 2018-19 (from new projects as well as from allocation from Central Sector and IPP Projects). Out of this, 2786.3 MW shall be added through non-conventional energy sources

(PEDA & NRSE) and balance 4044.8 MW through conventional sources.

As such the total available capacity by FY 2018 – 19 is expected to be 17786.31 MW (14419.06 MW– conventional and 3367.25 MW – Renewable (PEDA & NRSE).



Year wise Summary of Generation Capacity / Availability of Power upto FY 2018-19 are indicated in Table-5.2 below:

Table -5.2

Particulars	Year wise Existing & Likely Capacity to be added (MW) - Cumulative				
	As on March 2015	As Planned			
		FY2015 -16	FY2016 -17	FY2017-18	FY2018-19
STATE SECTOR					
• State Thermal	2640	2640	2640	2640	2640
• State Hydro including NRSE Hydro	1000.35	1000.35	1000.35	1000.35	1000.35
SUB TOTAL STATE SECTOR	3640.35	3640.35	3640.35	3640.35	3640.35
CENTRAL GENERATING STATIONS SHARE					
• CGS Thermal	2435.24	2435.24	2435.24	2435.24	2435.24
• CGS Hydro	977.54	977.54	977.54	977.54	977.54
• CGS Nuclear	196.80	196.80	196.80	196.80	196.80
SUB TOTAL CGS SHARE	3609.58	3609.58	3609.58	3609.58	3609.58
BHAKRA BEAS MANAGEMENT BOARD (BBMB) SHARE	1161.28	1161.28	1161.28	1161.28	1161.28
SUB TOTAL BBMB	1161.28	1161.28	1161.28	1161.28	1161.28
IPPs / PVT. SECTOR	2060	3920	3920	3920	3920
SUB TOTAL IPPs / PVT. SECTOR PLANTS	2060	3920	3920	3920	3920
NEW POWER PLANTS / NEW CGS SHARE					
• New Thermal	0	50	981	981	981
• New Hydro	0	723	946	1142.8	1203.8
SUB TOTAL NEW POWER PLANTS	0	773	1927	2123.8	2184.8
NON CONVENTIONAL (PEDA)	484.00	1029.00	1826.00	2622.80	3270.30
SUB TOTAL NON - CONVENTIONAL	484.00	1029.00	1826.00	2622.80	3270.30
TOTAL	10955.21	14133.21	16085.01	17077.81	17786.31

Source: State Power Utilities

Break up & details of capacities likely to be added year wise is indicated in Annexure- III.

Peaking & Energy Availability to Meet Peak & Energy Demand

Year wise peaking power availability has been worked out based on the peaking availability & auxiliary power consumption norms of each plants as per National Electricity Plan (Vol-I) for 12th five year Plan. However for solar power plant, 8% peaking availability has been

considered for estimation of Peak demand. Similarly the energy availability in each year has also been worked out based on the PLF & auxiliary power consumption norms of each plant as per National Electricity Plan and as per the state information. The availability of peaking capacity and energy availability have been worked out up to FY 2018-19 and shown in Table 5.3 below:

Table-5.3

Financial Year	Total Capacity (MW)	Peaking Capacity Available (MW)	Estimated Energy Availability at State Periphery	
			Energy from all Sources	Energy from RES & NRSE Projects
FY2015 - 16	14133.21	10494	71654	2891
FY2016 - 17	16085.01	11374	84203	4347
FY2017 - 18	17077.81	11974	89345	5797
FY2018 - 19	17786.31	12201	91219	7010

Based on the deliberation in the previous text, the scenario in the state emerges as shown in the Table-5.4a below.

It could be seen from Table-5.4a that the peak demand of Punjab would be about 13399 MW by FY 2018-19 considering the additional power requirement for providing 24x7 power supplies to the state. The expected energy requirement at state periphery for FY 2015-16 is about 52383 MU which is likely to increase to 66483 MU by FY 2018-19. It is also observed from Table 5.4a that the state will be facing a shortfall of about 3.14% to 8.94% in terms of Peak demand

during FY 2015-16 to FY 2018-19. However, during the same period, the state shall have availability of surplus energy in the range of 48.72 % to 36.79%. It is worth mentioning that Punjab State has a typical demand variation between paddy season (from June to September) and rest of the year. During paddy season the demand touches its maximum but reduces to less than half during rest of the year. The situation becomes further aggravated due to remarkably less industrial load in the state which otherwise would have provided steady load and stabilising effect on the fluctuations.

Table-5.4a

Sl. No.	Power supply position	Unit	Year wise Figures			
			FY 2015 - 16	FY 2016 - 17	FY 2017 - 18	FY 2018 - 19
1	Estimated Peak Requirement	MW	10904	11743	12514	13399
2	Estimated Availability of Peak / Maximum Demand as per state generation Plan	MW	10494	11374	11974	12201
3a	Peak Surplus (+) / Deficit(-)	MW	(-) 410	(-) 369	(-) 540	(-)1198
3b	Surplus (+) / Deficit(-)	%	(-) 3.76	(-)3.14	(-) 4.32	(-) 8.94
4	Estimated Energy Requirement at State Periphery	MU	52383	56620	61215	66483
5	Estimated Energy Availability at State Periphery as per state generation Plan	MU	71654	84203	89345	91219
6a	Energy Surplus (+) / Deficit(-)	MU	(+)19271	(+)27583	(+) 28130	(+)24736
6b	Energy Surplus (+) / Deficit(-)	%	(+)36.79	(+) 48.72	(+) 45.95	(+) 37.21

In order to mitigate seasonal load variation, Government of Punjab would have to effectively plan through comprehensive power procurement initiatives on short term, medium term & long term basis and look for procurement of power either through competitive bidding or through other sources. Government of Punjab may also arrange additional power during paddy seasons through

banking of power with other states having different seasonal load pattern. At the same time, the deficit in peak demand can be effectively reduced through proper implementation of DSM & Energy efficiency measures in the state. The state is also required to give more preference to Hydro & RES while procuring power in order to improve the hydro-thermal generation mix. This will not only help



in eliminating the peak shortage of the state but will also balance the energy supply & demand scenario. The generation mix as per the proposed generation plan of the state is shown in Table- 5.4b.

Further, the state is required to firm up plan for export of surplus energy to states facing power deficit and earn revenue during the periods when surplus energy is available.

Table-5.4b

Generation Mix

Financial Year	Thermal (%)	Hydro(%)	Nuclear(%)	RES (%)*
FY 2014-15	65.13	27.77	1.80	5.30
FY 2015-16	64.00	26.64	1.39	7.97
FY 2016-17	62.02	24.79	1.22	11.96
FY 2017-18	58.42	24.51	1.15	15.93
FY 2018-19	56.09	23.87	1.11	18.93

* including state NRSE Hydro

Projects of State Sector Under Construction / Planned for Execution in Future:

ShahpurKandi Power Project (Hydel-206 MW-UNDER CONSTRUCTION)

Power component of the project, which is 71.39% of the total cost, is being provided by PSPCL. REC has already given approval for 80% of the cost of power component as loan and remaining 20% of the cost of power component shall be arranged by PSPCL. Project is likely to be commissioned during FY 2017-18. Civil works are to be executed by Punjab Irrigation Department. Electromechanical works are to be executed by PSPCL for which work order has already been issued on BHEL. J&K Government has stopped the construction work of this project due to interstate dispute.

Mukerian Power House -Stage II - (Hydel - 18 MW - UNDER CONSTRUCTION)

Work of 18 MW Mukerian Power House Stage - II also is in progress. Project is likely to be commissioned on 31.12.2015. Construction work is being done by BHEL. Commissioning of this project has been delayed due to delays attributable to BHEL

Mukerian Thermal Power Plant - (Thermal - 2 x 660 MW - FUTURE PLAN)

PSPCL has envisaged a Thermal Power Project near Mukerian, Hazipur and has constituted a committee to study the viability / requirement of the plant. Committee has submitted the report and the same is under review / approval. PSPCL has written to GoP to conduct Social

Impact Assessment (SIA) study for the area to be acquired for developing the plant. For conducting various technical studies and for assisting PSPCL in obtaining services for clearances (MoEF / SPCB clearances, WAPCOS Ltd. (A GoI undertaking) has been selected through e-bidding process. Offer of WAPCOS was valid up to 30.06.15. However, so far the work order has not been issued to WAPCOS pending final approval of viability report. Subsequent to above activities, petition for approval of PSERC for undertaking development of project shall be filed.

Issues Regarding Coal Procurement Plan:

Generating Stations in Punjab are required to perform at higher PLF (ideally at 80 - 85%) (Gross generation) enabling state of Punjab to achieve "24 x 7 Power for All" for which there should not be any constraint of coal supply. Adequate and consistent availability of quality coal will also ensure that no capacity in Punjab remains unutilized for the want of coal.

However, unfortunately availability of coal for the power plants of Punjab, of late, has been erratic, inadequate and of poor quality. This has adversely affected PLF and has also rendered some of the capacities available unutilized.

Coal Requirement:

Punjab State Owned Thermal Units:

- The current coal scenario and the projections for next 5 years have been presented below in Table 5.5 below :



Table-5.5

Sl. No.	TYPE	Year wise Coal Requirement (Million Tonnes Per Annum)				
		FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
1	Domestic Raw Coal Requirement					
	Guru Gobind Singh Super Thermal Power Plant (GGSSTP)	6.488	6.488	6.488	6.488	6.488
	Guru Hargobind Thermal Plant (GHTP)	4.849	4.849	4.849	4.849	4.849
	Guru Nank Dev Thermal Plant (GNDTP)	2.263	2.263	2.263	2.263	2.263
	Total Requirement	13.6	13.6	13.6	13.6	13.6
2	Contracted Quantity of coal through Linkage	6.6	6.6	6.6	6.6	6.6
	Coal through coal block (Pachhwara Central)	7	7	7	7	7
	Total Contracted Quantity	13.6	13.6	13.6	13.6	13.6
3	Availability of domestic raw coal	8.486	13.6	13.6	13.6	13.6
4	Shortfall in domestic Raw Coal	5.114	0	0	0	0
5	Additional domestic raw coal requirement	5.114	0	0	0	0

Source: State Power Utilities

- b) Out of 13.6 MTPA, the linkage from CIL subsidiaries is 6.6 MTPA and linkage from PSPCL's captive mine i.e. Pachhwara (Central) is 7 MTPA. Peak Rated Capacity of Pachhwara Central coal mine is 7 MTPA.
- c) Against Annual Contracted Quantity of 7 Million Tonnes coal from Pachhwara Central coal mine during the year FY 2014-15, PSPCL received only 4.0 Million tones because Pachhwara (Central) coal mine allocated to PSPCL, had been cancelled by Hon'ble Supreme Court of India vide order dated 24.09.14.
- d) Pachhwara central coal block has been re-allocated to PSPCL by MoC, GoI vide letter dated 24.03.15 and allotment letter has been issued on 31.03.15. PSPCL is in the process of selection of Mine Developer cum Operator (MDO). Finalisation of MDO is likely to take 6 months after following competitive bidding route.

Power Plant Units of IPPs within Punjab State:

Scenarios of Coal for various IPPs within Punjab State are as given below in Table:

Table -5.6

Name of the Plant	Status / Scenario
Nabha Power Limited (NPL), Rajpura (2 x 700 MW)	Planned capacity of NPL power plant was 2x660 MW. However, during execution, capacity has been increased to 2x700 MW. Coal linkage of 5.55 MTPA is available to the plant based on planned capacity of 2x660 MW. Existing linkage (5.55 MTPA) is not proportionate to the enhanced capacity (2x700 MW).
Talwandi Sabo Power Plant (TSPL), Banawala (3 x 660 MW)	Planned capacity of TSPL power plant was 3x600 MW. However, during execution, capacity has been increased to 3x660 MW. Coal linkage of 7.72 MTPA is available to the plant based on planned capacity of 3x600 MW. Existing linkage (7.72 MTPA) is not proportionate to the enhanced capacity (3x660 MW).
GVK Goindwal Sabo Power Plant, Goindwal (2 x 270 MW)	Capacity of GVK Goindwal power plant is 2x270 MW. Coal linkage of 1.44 MTPA was available from Tokisud North Coal Block. However, Hon'ble Supreme Court cancelled the coal block in Aug.2014. Due to cancellation of coal block, coal is not available for the plant and therefore, commissioning and COD could not be declared. Otherwise, both the units are ready for coal firing.

Source: State Power Utilities

Import of Coal:

Due to prevailing uncertainty of coal supplies from Pachhwara Central, PSPCL has placed P.O. dated 22.05.15 on Adani Enterprise for supply of 6.0 lakhs Tonnes of coal during FY 2015-16.

This is a temporary arrangement. After appointment of regular MDO, PSPCL shall be in a position to meet the annual requirement of coal for its thermal power stations (13.6 Million Tonnes) from linked quantity allotted from CIL Source and from Pachhwara Central. Hence, PSPCL shall not need imported coal from FY 2015-16.

Issues related to Coal Availability:

- For NPL and TSPL, Coal Linkage not proportionate to the enhanced capacities of respective power plants.
- GVK Power & Infrastructure has applied for new coal block for their 2 x 270 MW power plant. Coal block / coal linkage to the power plant should be allotted expeditiously so that ready-to-use capacity available within Punjab is utilized.

c) Rail Connectivity for Nabha Power Ltd.

Rail connectivity for transportation of coal to NPL is to be made / provided. As the connectivity is not there, at present the coal is being transported from Mandi Gobindgarh to plant site by trucks. It leads to increased landed cost of coal and also results in shortfall in availability of coal.

- For Talwandi Sabo Power Ltd. (TSPL) and for Nabha Power Limited (NPL), an Appellate Tribunal has ordered that for a period of one year, only 80% quantity of respective allotted linkages shall be made available. NPL and TSPL have been advised to arrange balance 20% of coal through alternate sources.
- Punjab being at the farthest end, railway freight for transportation of coal is high (about 2.5 times the cost of coal). It increases cost of generation. Further, the quality of coal supplied also should be good i.e. Low Ash & High CV.



ACTION PLAN – STATE

To complete the generating capacities of State and to monitor the Central Sector & Private Sector Projects as per following Roll out Plan :

Table -5.7

Power for All (Roll Out Plan)	Year wise Addition (MW)				Total (MW)
	FY 2015 -16	FY 2016 -17	FY 2017-18	FY 2018-19	
State Sector	-	-	-	-	-
Central Generating Stations Share	-	-	-	-	-
Bhakra Beas Management Board (BBMB) Share	-	-	-	-	-
IPPs/ PVT. Sector/JV/ Partnership	1860	-	-	-	1860
New Power Plants / New Cgs Share					-
• New Thermal	50	931	-	-	981
• New Hydro	723	223	196.8	61	1203.8
Non Conventional (PEDA & NRSE)	545	797.8	796	647.5	2786.3
TOTAL	3178	1951.8	992.8	708.5	6831.1

The state is required to :

- To expedite finalization of MDO for re-allocated Pachhwarra Central Coal block.
- To take up the matter with MoC for allotment of Coal Linkage proportionate to the enhanced capacities of NPL and TSPL so that Punjab State does not have any unutilized capacity for want of coal.
- To procure more peaking power, if required from the market to meet the demand for providing 24x7 power in the state.
- Help GVK Power & Infrastructure Ltd. to obtain new coal block for their 2 x 270 MW power plant. Expeditious allotment of coal block / coal linkage is necessary so that ready-to-use capacity available within Punjab is utilized.
- To provide all necessary help and facilitations to NPL for rail connectivity from MandiGobindgarh to the plant site.
- To provide necessary help and facilitation to GVK power in taking up the issue of materialization of coal with MoC.
- To firm up plan to meet the additional requirement of Power by FY 2018-19 and beyond.
- To improve the generation mix (Thermal: Hydro ratio) through more tie up from hydro & renewable sources in order to stave off the peak shortage and to balance the energy supply & demand scenario.
- To take the matter with MoP, GoI for more allocation from Central Sector Projects (Hydro & gas based) to Punjab for meeting peak demand.
- To firm up plan to reduce the peak demand through demand side management and by adopting energy efficiency measures.
- To firm up plan for meeting the deficit in peak demand through banking of power with other states having different seasonal demand.
- To firm up plan export of surplus energy to states facing power deficit and earn revenue.
- To firm up plan to address coal procurement and coal availability issues (as discussed above) so that no capacity within Punjab state remains unutilized.



POWER PURCHASE PLANNING

The state will work towards institutionalizing and strengthening the Power Purchase Planning and Procurement Cell, which will dedicatedly work on the short / medium / long term power purchase planning and work on the procurement of power on cost effective basis.

This cell will also work on the monthly power availability from already tied up sources (on the basis of annual schedules provided by these sources) and accordingly work out the requirement for tying up power through competitive bidding route keeping into consideration the huge seasonal variation in availability of energy from various sources across the year.

Government of India (GOI) Intervention Required:

- J&K Govt. has stopped construction work of Shahpurkandi Project. Due to stoppage of work by J&K Government, REC is not releasing balance installment(s) of the loan. Intervention of State Govt./Central Govt. is required in this regard.
- For Mukerian Hydel Power Plant – Stage – II (18 MW) Intervention of Central Govt. is also required to put pressure on BHEL to complete the work as per scheduled commissioning date.
- To take up the matter and resolve related to coal linkage / materialization (as discussed above).

Fund Requirement:

The detail of estimated fund requirement of the state sector projects is given in table below :

Table -5.8

For State Sector Projects (Year wise Investment Plan*)

Name of the Project	Year wise Fund Requirement				
	(Rupees in Crores)				
	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
Refer Annexure - XII	201.25	360.25	478.25	650.00**	1500.00**

* Detail breakup for FY 2014-15 to FY 2016-17 is furnished in Annexure -XII

** As projected by PSPCL.

Financial Tie-ups

For 206 MW Shahpurkandi Project, which is likely to be commissioned during FY 2017-18, financial tie-up for taking 80% loan has been made with REC. Total cost of the Project is Rs. 2323.7 Crores (as per DPR – Rs. 2285.81 Crores), out of which share of PSPCL is 71.39% and of Punjab Irrigation Department is 28.61%. Civil works are to be done by Punjab Irrigation Department. Electro-Mechanical works are to

be done by PSPCL for which work order has already been issued on BHEL.

For Mukerian TPS (2x660 MW), REC has conveyed “In principal Approval” for 80% debt funding of Rs. 6120 Crs. subject to techno-economic appraisal and establishment of viability of project and balance 20% (Rs. 1530 Crs.) of the project cost shall be arranged by PSPCL.



The peak power demand and energy requirement of Punjab at state periphery during FY2014-15 is 10224 MW and 41438 MU respectively. The above requirement in the coming years is expected to increase significantly due to various factors i.e. increase in agricultural consumptions, increased uses of various electrical appliances in domestic sector, increase in commercial activities and industrialization in the state. Taking into account all the above factors and with an objective to provide 24x7 power supply to all, the expected power demand of Punjab by FY 2018-19 would be 13399 MW with annual energy requirement of 66483 MU. To meet this growing demand, a robust & reliable Inter-state & Intra-state transmission network is required. In view of this, existing transmission system would be strengthened both at Inter state level as well as Intra state level with proper planning to cater the future demand in a reliable manner. In order to improve the reliability in the transmission system, 400 kV Ring Main system has already been developed in the state having

connectivity with central grid at Amritsar and Moga. For detail refer Transmission map of Punjab 132 kV & above as on 31.03.2015 and map of Intra State 400 kV grid network with distance (attached in the report after Annexures).

Existing Inter State Transmission System (ISTS)

Presently about 2124 ckt. km of 400 kV EHV transmission line and six (6) numbers of Grid sub-stations at 400/220 kV level with total transformation capacity of 7030 MVA are existing in Punjab under Inter-state Transmission system of PGCIL.

Five (5) numbers of Grid substations at 220/132 /66kV level having total transformation capacity of 1740 MVA exists in Punjab under BBMB Hydro system.

The details of existing ISTS Grid sub-stations are as mentioned below:

Table-6.1

Details of existing Grid sub-station (ISTS)

SL No.	Name of GSS	Voltage Ratio	No. of Transformers	MVA capacity	Total Transformer capacity(MVA)
400 kV GRID SUBSTATION (PGCIL)					
1	400 kV PhaganMajra	400/220 kV	3	2X315+1x500	1130
2	400 kV Malerkotla	400/220 kV	3	2X315+1x500	1130
3	400 kV Ludhiana	400/220 kV	4	3X 315+1x500	1445
4	400 kV Moga	400/220 kV	4	1x250+1x315+2x500	1565
5	400 kV Balachak(Amritsar)	400/220 kV	3	1x500+2x315	1130
6	400 kV Jalandhar	400/220kV	2	2X315	630
				Total	= 7030 MVA
BBMB GSS					
1	220 kV	220/132 /66kV	5 Nos. GSS		1740 MVA (Total)

In order to facilitate the drawl of power by Punjab and to meet the projected peak load of 13399 MW by FY 2018-19, a robust Inter-state transmission system (ISTS) would be required. The present ISTS system capacity of PGCIL at 400/220 kV level is 7030 MVA and it would be increased to 8780 MVA by FY 2018-19 after implementation of ongoing schemes.

At PSTCL level, existing capacity at 400/220 kV level is 2890 MVA and it would be increased to 4890 MVA by FY 2016-17 after new addition & augmentation of substations. (For PSTCL detail refer Intra state transmission system indicated in the subsequent para of this chapter.) The combined Transformation capacity of PGCIL &

PSTCL system at 400/220 kV level would be 13670 MVA by FY 2018-19.

The various ongoing ISTS projects are outlined below :

**On-going /planned ISTS projects:
New GSS & Transmission lines**

- One number of new grid substation at Patran with capacity 2X 500 MVA at 400/220 kV level.

Table-6.2 a

New GSS

Project	Voltage Level	Unit (Nos. of GSS /MVA)	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19*
Inter-State Transmission Network	400 kV	1 GSS/(2 X 500 MVA)	1000 MVA	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-

Table-6.2 b

Upcoming ISTS LINES

Sl No.	Line	Voltage Level	Circuits
1	Mohali- Panchkula	400 kV	SC
2	Kurukshetra-Malerkotla	400 kV	DC
3	Malerkotla-Amritsar	400 kV	DC
4	Panchkula-Patiala	400 kV	DC
5	LILO of both ckts Patiala-Kaithal at Patran	400 kV	DC
6	LILO of Parbati Pooling Stn- Amritsar at Jalandhar	400 kV	SC

Augmentation on existing sub-stations

To meet the growing power demand of Punjab, augmentation of transmission capacity in following substations has been undertaken by PGCIL. This would enable Punjab to draw its share of power from the Grid:

- Augmentation of Transformation capacity at MOGA by replacement of 1X250 MVA Transformer by 1x500MVA, 400/220kV Transformer.
- Augmentation of Transformation capacity at Jalandhar Substation by 1X500 MVA, 400/220kV Transformer.

The above is expected to be commissioned during FY 2016-17.

On-going Tariff Based Competitive Bidding (TBCB) Schemes:

- Presently no scheme is under implementation under this head.

Inter and Intra state Transmission plan for evacuation of power from existing and upcoming Renewable Energy sources. Balancing Infrastructure envisaged for integration of large scale renewable.

The existing renewable energy generation including state's NRSE Hydro projects is 583 MW which would be increased up to 3369 MW by FY 2018-19. The power evacuation from renewable generation shall be done at distribution level of 11 kV from existing 132/11 kV & 66/11 kV PSS for small scale scattered generation. In case of Bulk generation, power would be evacuated at 33 kV or higher voltage level.

Renewable Energy Management centers proposed for Real time monitoring of Generation from RE sources:

Presently Renewable Energy Management center is not in existence but PEDA (Punjab Energy Development Agency) is working on Green Energy promotion in the state.

Adequacy to meet Power Transfer requirement of the state till FY 2018-19

The present ISTS system capacity at 400/220 kV CTU level is 7030 MVA and after new addition & augmentation, the transformation capacity would be increased to 8780 MVA. At PSTCL system existing capacity at 400/220 kV level is 2890 MVA & it would be increased to 4890 MVA by FY 2016-17 after new addition & augmentation. Hence the combined transformation capacity at 400/220 kV level would be 13670 MVA by FY 2018-19.

In addition to the above, the state's Intra State network is evacuating the power at 220 kV & below level from following Generation Units.

- 2640MW State Thermal power (GHTP, GNTG, GGHP) from FY 2014-15.

- 903.4 MW State Hydel power from FY 2014-15.
- 1161 MW BBMB power from FY 2014-15.
- 540MW GVK Goindwal from FY 2015-16.
- 583 MW in FY 2014-15 which increases to 3369 MW by FY 2018-19 from RES & NRSE projects.

From the above mentioned generating units, approximately 4504MW power was evacuated in FY 2014-15 at 220 KV and below level and about 4936 MW by FY 2015-16 onwards shall be evacuated at 220 kV and below level by Punjab State network.

The projected power demand of Punjab by FY 2018-19 would be 13399MW (14888 MVA). Considering drawl of power about 4936 MW (5484 MVA) by FY 2015-16 onwards from the state generating units at 220kV level and below, the balance power drawl at 400kV level would be around 8463 MW (9403 MVA) by FY 2018-19. Keeping in view the loading at 400 KV level, the proposed transformation capacity of 13670 MVA at 400/220 kV level by 2018-19 would be adequate to meet the expected load of the state.

The year wise generation capacity addition, total available capacity vis-a-vis transmission system available at 400 kV & 220 kV and below level is tabulated as under:

Table 6.3

Year	Generation Within Punjab - Intra state (MW)		Inter state (ISGS) - Generation for Punjab (MW)		Total Available capacity (in MW)	Peak Power Demand of Punjab only 400 kV level (Peak Power Demand- Power Evacuated at 220 kV level and below) MW	Minimum Transformation capacity required at 400 kV level(MVA)*	Transmission System existing/Planned at 400 kV level including PGCIL & PSTCL (Interstate & Intrastate) 400 kV GRID S/S MVA
	Addition	Total	Addition	Total				
FY 2015-16	2423	9770	755	4365	14135	10904-4936=5968	9947	12670
FY 2016-17	798	10568	1154	5519	16086	11743-4936=6807	11345	13170
FY 2017-18	961	11529	32	5551	17079	12514-4936=7578	12630	13670
FY 2018-19	648	12176	61	5612	17788	13399-4936=8463	14105	13670
* Minimum Transformer capacity in MVA=Peak Power Demand at distribution level ((in MW/0.9) x1.5))								

In view of the above, a detailed planning at appropriate substations would have to be done by PSTCL and PGCIL to have more reliability in the system.

Action Plan - CTU (Central Transmission Utility)

- Ongoing schemes (New Substation & Transmission line) shall be implemented as per schedule by PGCIL for ensuring robust transmission system.
- Adequate planning & implementation to be ensured to make the system more reliable for FY 2018-19.

Intra state Transmission System:

The existing Intra state transmission capacity at 400kV GSS level (400/220 kV) is 2890 MVA, at 220 kV GSS level (220/132 kV, 220/66 kV etc) is 21862 MVA and at 132 kV GSS level (132/66 kV, 132/33 kV, 132/33-11 kV etc) is 6537MVA.

The ongoing strengthening program of existing Intra-state transmission system is under implementation. After implementation of this plan the existing transformation capacity shall increase to 34729 MVA at 220 KV & 132 kV GSS level by FY 2018-19 and 4890 MVA at 400kV GSS level by FY 2016-17 after new addition & augmentation.

Existing Intra state Transmission System:

The transmission network as on March 2015 that presently caters to the power demand across the State is as follows:

Total 167 numbers of EHV sub-stations from 400 kV to 132 kV level having total transformation capacity 31289 MVA along with 11436 Ckt.Km of associated Transmission line. The detail of existing

& augmentation plan at each voltage level is indicated below:

- 4 Numbers of 400 kV grid substations (Dhuri, Mukatsar, Makhu, Nakodar 2890 MVA are already in operation. After construction of New Substation & capacity enhancement, it would be increased to 4890 MVA with 1584 Ckt.km of associated lines.
- 88 Numbers of 220 kV grid substations with 21862 MVA capacity & 75 Numbers of 132 kV GSS with 6537 MVA capacity and total Ckt km at 220 kV level is 6716 Ckt.km & 132 kV level is 3136 Ckt.km of associated lines.

Note: List of existing 400kV, 220 kV & 132 kV substations and transmission lines is enclosed as Annexure-IV.

Details of Ongoing/ Planned Intra-State Transmission system.

New sub-stations, Augmentation / Transmission lines

- One Number 400 kV New Grid Substation at Rajpura(2x500 MVA) has already been approved. It may be commissioned during 2015-16. The capacity augmentation at Dhuri (1x500 MVA), Mukatsar (1x500 MVA) and New Grid Substation at 400 kV Rajpura (2 x500 MVA) has also been approved. After construction of New Substation & capacity enhancement, the total capacity at 400 kV PSTCL level shall increase to 4890 MVA.
- 13 Numbers New Substations with 5472.5 MVA Transformation capacity additions at 220 kV GSS level shall be done by FY 2017-18.



The year wise Transmission plan of New Grid sub-station, augmentation & Transmission lines are as follows:

Table-6.4

Project	Voltage Level	Unit/ Substation	Existing as on March 2015	FY 2015-16	FY 2016-17	FY 2017-18*	FY 2018-19*
Intra-State Transmission Network	400 kV	No./MVA	4/2890	1/1000	-/2x 500	---	----
		ckt. km.	1584	0	---	----	----
	220kV	No./MVA	88/21862	5/1672.5	5/2160	3/1640	--/800
		ckt. km.	6716	719	730	330	250
	132 kV	No./MVA	75/6537	--/57.5	----	----	----
		ckt. km.	3136	---	-----	----	-----

* Considering the load growth of the previous year, infrastructure for FY 2018-19 has been envisaged.

Augmentation on existing sub-stations

- The augmentation work at 220 kV & 132 kV are also initiated. 800 MVA at 220 kV & 57.5 MVA at 132 kV level shall be added at FY 2018-19. The augmentation work up to FY 2017-18 has already mentioned in the above.

The details of year wise ongoing/ planned Intra-state transmission system are enclosed as Annexure-V.

Adequacy to meet Power Transfer requirement of the state till 2019

The year wise peak power demand of state, vis-a-vis transmission system available at 220 kV & 132kV level for Punjab is tabulated as under:

Table- 6.5

Year	Peak Power Demand (MW)		Minimum Transformation capacity required(MVA)*	Transmission System existing/Planned at 220 kV & 132 kV level (MVA)*	
	Addition	Total		Addition	Total
FY 2014-15	0	10224	17040	0	28399
FY 2015-16	680	10904	18173	1730	30129
FY 2016-17	839	11743	19572	2160	32289
FY 2017-18	771	12514	20857	1640	33929
FY 2018-19	885	13399	22332	800	34729

* Minimum Transformer capacity in MVA=Peak Power Demand at distribution level ((in MW/0.9)x1.5)

(*) Projected transmission capacity based on planning.

As such, the existing Intra-state transmission system of Punjab is adequate to meet the projected peak demand of Punjab of 13399 MW by FY 2018-19 at 220kV level as well as downstream level.

Year wise fund requirement for development of Planned Transmission system:

Total estimated investment of about Rs. 1325 Crores from FY 2015-16 to FY 2018-19 has been envisaged for intra state system. The Rs. 1325 Crores estimated investment includes Rs 26

Crores for ERP works & Rs 28 crores SLDC works by FY 2015-16 to FY 2018-19 apart from Transmission Infrastructure investment. Details of year wise investment plan for transmission infrastructure system from FY 2015-16 to FY 2018-19 are indicated in Table-6.6 below :

Year wise details of Physical targets and proposed investments are detailed in Annexure-V.



Table- 6.6**Intra State& Transmission system investment (PSTCL)**

SL No	Financial Year	Investment Rs. (Crores)
1	2015-16	500
2	2016-17	395
3	2017-18	260
4	2018-19	170
Total Investment in Intra state		1325

Action Plan – PSTCL (STU)

The ongoing scheme needs to be implemented as per proposed plan for ensuring 24x7 power supply in State. Financial tie up for approved infrastructure shall be undertaken timely with the funding agencies and it is envisaged that State Govt. shall provide 20% equity support.

State Government intervention

The state government shall expedite all necessary assistance (i.e Right of Way clearance, Forest clearance if any, land acquisition problems etc) to STU for installation of new substation and associated transmission lines to provide 24x7 power to all in Punjab.

Government of India intervention

- Mitigation of Right of way constraints and availability of land: Formation of policy to provide uniform compensation for acquiring the Right of Way for Transmission lines.

Initiatives Taken by the State on SCADA & SUBSTATION AUTOMATION

- Substation automation for unmanned operations at 5 Numbers Grid Substation has been initiated.

- Provision of Remote Terminal Units (RTU) at 220 kV, 132 kV Grid Substations and Generating Stations for reliable communication and protection.
- Replacement of conventional ground wire with Optical Fibre Ground Wire (OPGW) to serve the purpose of earth wire as well as data transfer in the system.

Any other issues/ Achievements

- Introduction of 220kV Multi-circuit narrow base towers for use in congested areas / with ROW issues.
- Real Time System energy accounting through ABT compliance Boundary Metering Scheme implemented to calculate real time energy losses.
- Implementation of ERP scheme, web based software development has been initiated.
- Oil and Diagnostic Lab at Ludhiana which is under construction will help for Testing of Big Transformer, Reactors etc in the region.
- Procurement of Polymer insulators for 220 kV lines to have higher reliability during foggy weather.

CHAPTER – 7 : DISTRIBUTION PLAN

In Punjab, electricity is being distributed by state-owned Punjab State Power Corporation Limited (PSPCL). At present, electricity is being provided round the clock for 24 Hours both in rural & urban areas. However, the state is supplying electricity to agriculture consumers for 6-8 hrs. on daily basis as per the requirement and has no plan to increase the period further.

The per capita consumption of power in Punjab was 1799 units during 2013-14 which is much higher than the National Average of 1010 units observed during FY 2014-15.

The power demand of the state is expected to increase from 11534 MW to 13399 MW by FY 2018-19 due to natural increase in demand from the present consumer base, addition of new households and more industrialization / commercial activities in the state. The objectives of this Roadmap for supplying 24X7 Power For All (PFA) to all consumers can be achieved through capacity augmentations,

building redundancies in the upstream network, adopting appropriate technologies and efficient systems for reliable & quality power for end consumers in the state of Punjab.

Existing Distribution system

Presently, the distribution network of Punjab is consisting of 1,49,698 Ckt Kms low tension lines, 2,14,860 Ckt Kms 11 kV lines and 9,170 Ckt Kms 66kV & 33 kV lines. There are 705 numbers of Power Sub-Station (consisting of 66/11kV & 33/11kV) and 7,54,567 numbers of distribution transformers in the state. The total installed capacity of 66/11 kV and 33/11 kV power transformers is 19,016 MVA, whereas, the installed capacity of 11/0.415kV distribution transformers is 26,523 MVA as on 31st March 2015.

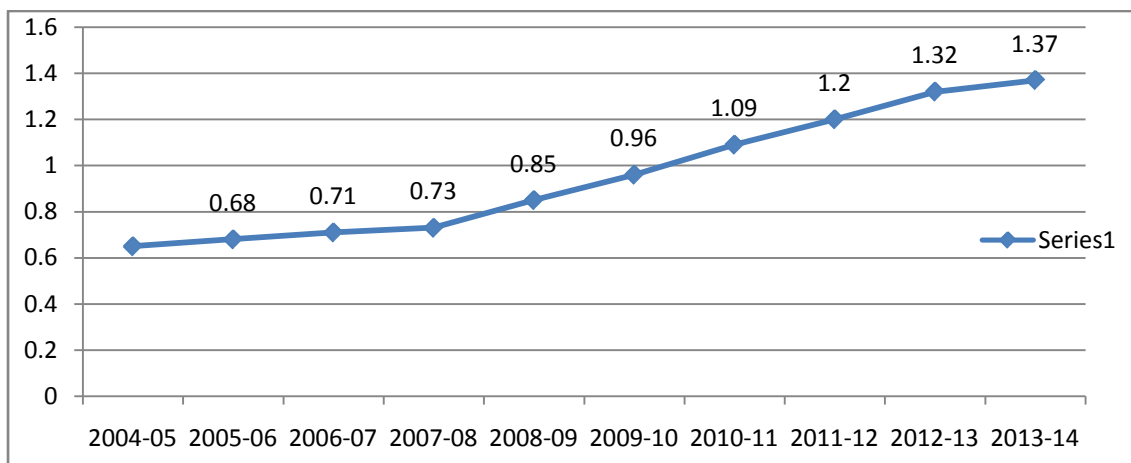
The details of existing distribution system in FY 2014-15 are furnished below in Table-7.1.

Table-7.1

Sl. No.	DESCRIPTION	Unit	STATUS
1	No. of 66kV / 33kV Lines/feeders	Nos	774
2	Total length of 66kV / 33kV lines	Ckt Kms	9170
3	Total No. of 66/11KV & 33/11kV PSS	Nos	705
4	Total capacity of 66/11KV & 33/11kV PSS	MVA	19016
5	Total No. of Distribution transformers	Nos	754567
6	Total Capacity of Distribution transformers	MVA	26523
7	No. of 11kV Lines	Nos	9300
8	Total length of 11kV lines	Ckt Kms	214860
9	Total length of LT Lines	Ckt Kms	149698

During the period from FY 2005-06 to FY 2014-15, PSPCL has taken several measures like HVDS, feeder segregation, etc in the state as a result of which the HT to LT ratio has increased

from 0.68 to 1.44. The year wise increase in HT to LT ratio is furnished below;



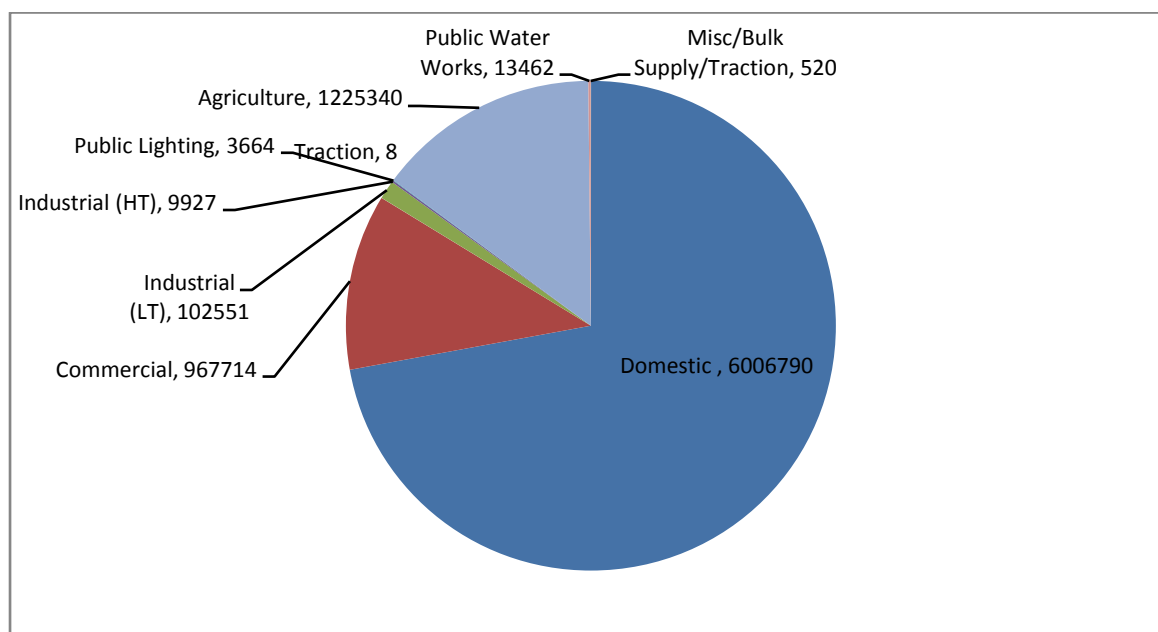
CATEGORY WISE CONSUMER

At present, there are about 84.137 Lakhs of electricity consumers in the state, out of which about 12.25 Lakhs consumers are under

agriculture category. The category wise number of consumers at the end of FY 2014-15 is furnished in Table-7.2below;

Table- 7.2

Sl. No.	CATEGORY OF CONSUMER	NUMBER
1.	Domestic	6006790
2.	Commercial	967714
3.	Industrial (LT)	102551
4.	Industrial (HT)	9927
5.	Public Lighting	3664
6.	Traction	8
6.	Agriculture	1225340
7.	Public Water Works	13462
8.	Misc/Bulk Supply/Traction	520



DT FAILURE RATE

The failure rate of Distribution Transformers in the state is about 7.74% during 2014-15.

DISTRIBUTION SCHEMES UNDER IMPLEMENTATION

R-APDRP

Ministry of Power, Govt. of India, has launched the Restructured Accelerated Power Development and Reforms Program (R-APDRP) in the XIth Five Year Plan as a Central Sector Scheme to cover urban areas - towns and cities with population of more than 30,000 as per Census of 2001. Power Finance Corporation Limited (PFC) has been designated by GoI as the Nodal Agency for the program. The continuation of RAPDRP for 12th & 13th plan has been subsumed in the newly launched IPDS scheme in Dec 2014. The focus of the R-APDRP programme was on actual, demonstrable performance in terms of sustained loss reduction. Establishment of reliable and automated systems for sustained collection of accurate base line data and adoption of Information Technology in the areas of energy accounting will be essential before taking up the regular distribution strengthening projects.

The programme was divided into two (2) parts Part - A and Part - B. Part - A included projects for establishment of baseline data and IT applications like Meter Data Acquisition, Meter Reading, Billing, Collections, GIS, MIS, Energy Audit, New Connections, Disconnections, Customer Care Services, Web self-service, etc. & verification of baseline AT&C losses as well as implementation of SCADA/DMS (Supervisory Control And Data Acquisition/Distribution Management System).

Part-B of RAPDRP included regular distribution strengthening projects i.e. renovation, modernization and strengthening of 11kV lines and substations, Re-conductoring of lines at 11kV level and below, Load Bifurcation, Feeder Separation, Load Balancing, HVDS (11kV), Aerial Bunched Conductor in dense areas, replacement of electromagnetic energy meters with tamper

proof electronic meters, installation of capacitor banks & mobile service centers, etc.

100% grant is provided under R-APDRP Part-A projects, while a maximum of 50% grant is being provided for Part B projects after fulfilling certain conditions.

Status of R-APDRP Part-A

This scheme is for implementation of IT in distribution Sector and is being implemented in 47 Towns of Punjab having population more than 30,000. The total approved cost of the scheme is Rs. 272 Crores. The work is in progress and is expected to be completed by March 2016.

Status of R-APDRP-Part A –SCADA projects

1. SCADA is a part of R-APDRP Part-A scheme and have been approved for 3 big towns namely Ludhiana, Amritsar & Jalandhar of Punjab as the towns have been selected based on population greater than four lakhs and annual input energy more than 350 million units.
2. The total scheme outlay is around Rs. 52 Crores for SCADA system which also involves improvement in Distribution Management System and Automatic Control upto 11 KV Feeders. The Consultants, M/s NDPL have been appointed and the work has been awarded to M/s Siemens. The construction of SCADA buildings at all the 3 towns have been started and the scheme is expected to be implemented by October, 2016.

STATUS OF R-APDRP Part-B

The total approved cost of Part-B scheme is Rs. 1632.73 Crores for 46 towns in Punjab.

The R-APDRP work in 24 towns is in progress. The order for 20 towns was awarded to M/s Godrej and 4 towns to M/s L&T where work is going on in full swing and about 50% work has already been completed. The towns for which work orders have been placed are **Amritsar, Jalandhar, Ludhiana East, Ludhiana West,**



Patti, Hoshiarpur, Kapurthala, Phagwara, Gurdaspur, Pathankot, TaranTaran, Batala, Nakodar, Sunam, Sirhind, Nangal, Rajpura, Sangrur, Malerkotla, Samana, Nabha, Barnala, Kharar & Jagraon.

In addition, M/s L&T Ltd. have commissioned 2 nos. 66 kV substations in Ludhiana at Fountain Chowk and Basant Park. Out of these two substations, Basant Park substation is located in the interior of the city catering to the highly commercialized areas of Ludhiana and shall improve the voltage profile and quality of supply. Work is in full swing in 9 nos. sub stations namely Nabha, Kanno, Khillrian, Gurdaspur, Batala, Pathankot, Tarantaran and two nos. in Amritsar and are likely to be commissioned shortly.

The process of re-tendering in the remaining 22 towns is still in progress as the earlier work order was cancelled due to non-performance by A2Z Company. The details of work are given in **Annexure-IX.**

The details of funds received and utilized against RAPDRP (Part-B) and the financial progress of PSPCL in R-APDRP, Part-B as on 20.05.2015 are given in **Annexure-VI& X.**

Following benefits were created and made available to the consumers in R-APDRP, Part-A;

1. Anytime, anywhere bill payment through internet portal and designated Bill Payment Machines
2. Greater interface with the power utility with the availability of SMS alerts for bill payments or power shut downs
3. IVRS based complaint handling portal for redressal of supply related complaints besides the status updates on the service requests
4. Quick pay feature for easy on-line payment through PSPCL website with around 4000 transactions per day

5. Availability of GIS based network maps to help the line maintenance activities thereby ensuring better supply quality to the consumers by reducing breakdown period
6. Single window system made operational for consumers
7. Facility of online submission of application for new connections or any other related services
8. Increase in overall productivity of the utility ultimately leading to lower cost to the consumers

Following benefits were made available to PSPCL for enhancing the satisfaction level of consumers under R-APDRP, Part-A;

1. Updated monthly assessment report
2. Transformer over load report
3. Transformer phase unbalance report
4. PSPCL got equipped with enabling tools like accurate Energy Auditing up to DT Level.
5. DT Metering helping in reduction of failure rate of Distribution Transformers
6. Reduction of AT&C losses by identifying loss areas
7. Accurate & transparent billing & collection resulting in increased revenue
8. Lower customer complaints saving cost on manpower
9. MIS reports helping in operational efficiency and better decision making
10. Better asset management resulting in lower cost of maintenance & longer asset life
11. Reduced human interface ensuring efficient and error free working
12. Introduction of ERP in HR & Finance



13. IT being introduced to manage inventory and accounting

RGGVY

Government of India launched RGGVY scheme during 10th plan period for providing access to electricity to all rural households in the country. The scheme was continued during 11th Plan and during continuation in 12th & 13th plans, the RGGVY scheme has been subsumed in Dec 2014 in the newly launched DDUGJY scheme of GOI.

Under 11th Plan of RGGVY, 17 projects at an Estimated cost of Rs 186.91 Crores were sanctioned for the state of Punjab for intensive electrification of 6297 villages and for providing free electricity connections to 92988 BPL

Households in the state. All the works have already been completed in the state and an amount of Rs 59.90 Crores has been disbursed. *Closure Proposals are being submitted to REC by PSPCL for closure of RGGVY project.*

REDUCTION IN AT&C LOSSES

AT&C losses in the state are targeted to be decreased to 15.3% in FY 2018- 19 from 16.66% in FY 2014-15 as per loss trajectory committed to MoP by the state. As per State, the above loss is also inclusive of Intra State Transmission loss which is about 2.5% as per PSERC tariff order.

The projected AT & C losses of PSPCL are summarized below :

Table- 7.3

AT & C Losses Trajectory

Year	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
Distribution losses	14.01	13.50	12.98	12.82
Intrastate Transmission losses	2.50	2.50	2.50	2.50

PSPCL have envisaged following measures for bringing down AT&C losses in the State;

1. Shifting of Meters outside Consumer Premises
2. Revamping of Distribution system in 46 towns under RAPDRP and further in 102 towns under IPDS
3. Replacement of old and undersized Conductor with new and bigger size conductors
4. Load balancing on 11KV feeders / LT feeders
5. Reconfiguration of HT Network (Reduction of Long Lengthy 11kV / 22kV / 33kV Feeders)
6. HT & LT Capacitors / Star rating DT
7. HVDS and ABC in theft prone areas
8. Replacement of Electromechanical/ faulty meters with new Static meters

SCHEMES BEING UNDERTAKEN FOR FURTHER REDUCTION OF AT&C LOSSES

➤ SMART GRID PILOT PROJECT

Smart Grid pilot project is being implemented in Mohali town. There are two main attributes of this project. The first one is implementation of Advanced Metering Infrastructure (AMI) by which utility can reduce their AT & C losses & average cost of billing and the second one is peak load management by which utility can reduce peak load demand by consumer participation. The total scheme outlay is Rs. 10.11 Crores and 50% funding is being provided by GOI under RAPDRP Part C. The tendering for engaging implementing agency is in process and the scheme shall be implemented by July 2016.

➤ **HVDS SCHEME**

The scheme is intended to reduce AT&C losses in the state. Out of 9.5 lakhs existing & old AP connections fed on LT Feeders, 2.11 lakhs have been covered in 25 nos. HVDS schemes by installing 1,86,072 Nos. dedicated DTs. Decision regarding execution of balance works is under consideration of PSPCL.

➤ **SHIFTING OF METERS OUTSIDE THE CONSUMER PREMISES**

Out of 38.1 Lakhs meters to be shifted outside the consumer premises in Non-APDRP areas, PSPCL has already shifted approximately 27 Lakhs meters.

Out of 11.84 Lakhs meters to be shifted in Urban Areas under R-APDRP (Part-B), PSPCL has already shifted 5.98 Lakhs meters.

➤ **ARTC SCHEME FOR RELEASE OF NEW TUBEWELL CONNECTION**

PSPCL has launched ARTC Scheme for release of approximately 45,000 new tube-well connections in the state. A total of 30,199 applications have been received till date and out of which 28,685 connections have been released. The release of balance 1,514 connections has been stayed by Hon'ble National Green Tribunal (NGT).

➤ **T&D LOSS REDUCTION SCHEME FOR NON APDRP AREA**

The cost of this scheme has been estimated as Rs. 1005.27 Crores. Work of installation of 11.81 Lakhs DT/ feeder meters amounting to Rs. 679 Crores is being carried out on turnkey basis. The completion period is 14 months. Balance work of 5.48 Lakhs connections is being carried out departmentally.

➤ **STRENGTHENING OF SUB TRANSMISSION & DISTRIBUTION SYSTEM**

This is a normal development scheme for strengthening of Sub-Transmission & Distribution System of PSPCL in order to ensure 24 hour continuous supply to general

consumers and 8 hours supply to the farmers. Its expenditure is being met through GOI funding under IPDS/RAPDRP/DDUGJY/RGGVY, out of the PSPCL funds as well as loans from REC/ PFC.

Improving Consumer Convenience & Revamping Maintenance Philosophy

Measures adopted for consumer Convenience

- 53 customer care centres in all major towns of Punjab
- 104 Divisional Nodal Centres for round the clock registration, monitoring & resolution of Consumer complaints
- Centralized electricity call centre for registration, monitoring & resolution of Consumer complaints
- 100 % Third party feedback of all registered complaints
- On-line registration System for all categories of consumers for 100 KW load & above to provide transparent, hassle free and Time Bound clearances for industrial connections.
- On-line registration system also facilitates NOC/Approvals for Electrical Layouts for Shopping Malls, Industrial Estates, and Residential Colonies, etc.
- Multiple bill payment options
- Accurate & transparent billing & collection resulting in increased revenue

Performance Monitoring Mechanism in PSPCL

Performance of Circle, Division and Sub-division is being monitored based on T&D losses along with Billing Efficiency and collection efficiency and is reviewed on monthly basis.

In order to implement the appropriate reform measures and to meet the 24x7 objectives, baseline parameters need to be verified and established, and hence it is proposed that a Third Party Audit should be carried out for establishing the baseline parameters for the KPI



indicated below and thereafter following performance parameters needs to be monitored at PSPCL Corporate level.

Table-7.4

Corporate Strategic Objectives	KPI	UOM
Maximize Rate of Return	PAT	Rs. Crs
	No of households to be electrified	Nos in Lakhs
	CAPEX	Rs. Crs
Sustain AT&C loss level & achieve further reduction	AT&C Losses	%
	Collection Efficiency	%
	Billing Efficiency	%
Monitoring Distribution Cost	Establishment Cost	Rs. Crs
	R&M Cost	Rs. Crs
	A&G Cost	Rs. Crs
	Power Purchase Cost	Rs./unit
Enhancing Customer Satisfaction	CSI Overall	Index
	Total Consumer Complaints/ '000 consumers	Nos.
	New initiatives to enhance customer convenience	Nos.
	Addition in regards to Payment Avenues	Nos.
	PA Compliance Index	Index
Operational Efficiency	No. of customers served /employee	Ratio
System Reliability	SAIDI	Hrs
	SAIFI	nos.
	DTR Failure Rate	%
	PADCI (Project Av. Duration Closure Index)	Months
	No of Accidents (Fatal/ Non Fatal)	Nos

The Fund requirement of the Sub transmission work & ongoing distribution schemes are furnished in table no 7.5 & 7.6.

Table 7.5

FUND REQUIREMENT FOR SCHEMES ALREADY SANCTIONED&UNDER IMPLEMENTATIONAND FOR PROPOSED SCHEMES

(In Rs Cr)

Sl. No.	Name of Scheme/ Project	FY2015-16	FY2016-17	FY2017-18	FY2018-19	Total	SCHEME
1.	Works relating to R-APDRP-Part-A (including SCADA)	50	104.39	0	0	154.39	R-APDRP
2.	Work relating to R-APDRP- Part-B	900	487.79	0	0	1387.79	R-APDRP
3.	Others (Renovation & Augmentation of Distribution Network, Shifting of meters outside consumer premises, Providing 11 KV manual operated switched capacitors, Comprehensive T&D loss reduction plan, HVDS in Agriculture, Release of Tube well connections, etc.)	1877.97	1708.7	2157.465	1939.27	7683.405	State Scheme
4	RGGVY	5				5	RGGVY
	TOTAL DISTRIBUTION ESTIMATES FOR ON GOING WORKS	2832.97	2300.88	2157.465	1939.27	9230.585	

Table 7.6

(In Rs Cr)

Sl. No.	Name of Scheme/ Project	FY2015-16	FY2016-17	FY2017-18	FY2018-19	Total	SCHEME
1.	SUB-TRANSMISSION UNDER PSPCL	480	550	566.50	614.08	2210.58	State Scheme



PROPOSED SCHEMES FOR RURAL & URBAN AREAS

To provide 24x7 quality & reliable power to the consumers in the state, PSPCL have formulated a plan for augmentation of distribution system in rural and urban areas. The estimated cost of proposed works in rural areas is about 514 Crores whereas, 352 Crores is estimated for urban areas. The works of feeder separation, establishment of new PSS, augmentation of existing PSS, new 66 & 11 kV lines, LT lines & metering are proposed to be implemented in the State by FY 2018-19. The fund requirement is given in table 7.6.

Table- 7.7

The Fund Requirement for the Urban & Rural Areas

(In Rs Cr)

Sl. No.	Name of Scheme/Project	Fund Requirement
1	Urban Areas	352 Crores
2	Rural Areas	514 Crores
	Total Distribution	866 Crores

Govt of India Schemes for Distribution Sector

Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY)

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

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

The components at (i) and (ii) of the above scheme will have an estimated outlay of Rs. 43033 crores including a budgetary support of Rs. 33453 crores from Government of India during the entire implementation period.

As already mentioned, the scheme of RGGVY as approved by CCEA for continuation in 12th and 13th Plans has been subsumed in this scheme as a separate rural electrification component for which CCEA has already approved the scheme cost of Rs. 39275 crores including a budgetary support of Rs. 35447 crores. This outlay will be carried forward to the new scheme of DDUGJY in addition to the outlay of Rs.43033 Crores. REC is the nodal agency for the operationalization of DDUGJY in the Country.

PSPCL has submitted the fund requirement of all five Distribution Zones covering system strengthening, metering & feeder segregation etc. at an estimated cost of Rs. 514 Crores under DDUGJY.

In the meeting held on 6.8.2015, Monitoring Committee headed by Secretary (Power) approved the DDUGJY projects with Rs 252.06 Crores for Punjab which includes projects worth Rs160 Crores for system strengthening, Rs. 84.82 Crores for metering and Rs. 5.02 Crores for Sansad Adarsh Gram Yojna along with 0.88 Crores for 3 Nos. of Feeder segregation. The remaining fund as per the requirement would have to be arranged by the State. Detailed requirement under DDUGJY is furnished in **Annexure-VII**.

Integrated Power Development Scheme (IPDS)

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

- Strengthening of sub-transmission and distribution networks in the urban areas
- Metering of distribution transformer/ feeders/ consumers in the urban areas
- 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 of R-APDRP to IPDS.

The components at (i) and (ii) above will have an estimated outlay of Rs. 32,612 crores including a budgetary support of Rs. 25,354 crores from Government of India during the entire implementation period.

The scheme of R-APDRP as approved by CCEA for continuation in 12th and 13th Plans has been subsumed in this scheme as a separate component relating to IT enablement of distribution sector and strengthening of distribution network [component (iii) above] for which CCEA has already approved the scheme cost of Rs. 44,011 crores including a budgetary support of Rs. 22,727 crores. This outlay will be carried forward to the new scheme of IPDS in addition to the outlay indicated above. PFC is the nodal agency for the operationalization of IPDS in the country.

Under IPDS, Govt. of Punjab has the requirement with an estimated cost of 352 Crores for augmentation of distribution system in 102 towns in the state. Monitoring Committee headed by Secretary (Power) in its meeting held on 6.8.2015 approved the IPDS projects in 102 towns at an estimated cost of Rs 324.0 Crores. The Zone wise details of activities covered in the IPDS schemes is attached in **Annexure-VIII**.

ASSESSMENT OF ADEQUACY OF DISTRIBUTION SYSTEM

The distribution network growth in Punjab as planned by PSPCL under various ongoing and forthcoming schemes is furnished in table 7.8.



Table-7.8

THE NETWORK GROWTH AS PLANNED BY PSPCL UNDER VARIOUS ONGOING AND FORTHCOMING SCHEMES

Sl. No.	Particulars	Status of FY 2014-15	During FY 2015-16	Cumulative Up To FY 2015-16	During FY 2016-17	Cumulative Up To FY 2016-17	During FY 2017-18	Cumulative Up To FY 2017-18	During FY 2018-19	Cumulative Up To FY 2018-19
1	No. of 33/66 KV Lines /feeders	774	14	788	14	802	14	816	14	830
2	Total length of 33/66 KV lines in ckt. Kms	8788.7	600	9390	600	9990	600	10590	600	11190
3	Total No. of 66/11KV &PSS	693	37 (25+12)	730	25	755	25	780	25	805
4	Total capacity of 66/11 KV PSS in MVA	18785	1829	20845*	1826	22671	1826	24497	1826	26323
5	Total No. of 33/11KV PSS	12	0	0	0	0	0	0	0	0*
6	Total capacity of 33/11 KV PSS in MVA	231	0	0	0	0	0	0	0	0*
7	Total No. of Distribution transformers	754567	100230	854797	115267	970064	132555	1102619	151514	1254133
8	Total Capacity of Distribution transformers in MVA	26523	3462	29985	3515	33500	3561	37061	3581	40642
9	No of 11 KV Lines	9300	930	10230	935	11165	940	12105	945	13050
10	Total length of 11kV lines in ckt. Kms	214859.93	53727	268586.93	54778.5	323365.43	62995	386360.43	47562	433922.43
11	Total length of LT Lines in ckt. Kms	149697.89	22874	172571.89	26305	198876.89	30251	229127.89	34578	263705.89

* 33/11 kV PSS is converted into 66/11 kV PSS after FY 2014-15.



From the above table, it is evident that the transformation capacity at 66/11kV and 33/11 kV is projected to grow from 19016 MVA in FY 2014-15 to 26323 MVA in FY 2018-19 and distribution transformation capacity at 11/.415 kV level is projected to grow from 26523 MVA in FY 2014-15 to 40642 MVA in FY 2018-19.

The Projected peak demand of the state including demand of large industrial consumers at state periphery has been projected at 13399 MW in FY 2018-19. The energy billed for HT (Industrial 33 kV bulk) consumers in FY 2014-15 is 9697 MU and after taking the same consumption in FY 2018-19, the load of 33 kV consumer in FY 2018-19 would be about 600 MW.

Keeping in view of the above, the corresponding demand met at 11 kV and below would be 12799 MW (13399 MW - 600 MW) which corresponds to 14221 MVA considering a power factor of 0.9. Against this peak requirement at 66/11kV and 33/11 KV level, the installed capacity in FY 2018-19 is projected at 26523 MVA. This shows that the sub transmission system would be adequate for meeting the projected demand and average loading of the system would be around 54% on 66/11kV and 33/11 KV transformers under peak demand condition.

Similarly, based on the present condition, the projected load of 11 kV consumers in FY 2018-19 would be about 650 MW and the corresponding demand at 11 kV and below would be around 12149 MW (12799 MW - 650 MW) which corresponds to 13499 MVA considering a power factor of 0.9. Against this peak requirement, the installed distribution transformation capacity at 11/0.415kV level would be around 40642 MVA by 2018-19 which shows that the Distribution transformation

capacity planned at DT level for FY 2018-19 would be adequate for meeting the projected demand by 2018-19 and average loading of DTs would be around 33% under peak demand condition.

ACTION POINT-FOR STATE GOVERNMENT

1. To complete all the distribution works necessary for providing 24x7 quality power supply to all the connected consumers
2. To meet the agreed trajectory for reduction of AT&C losses through initiatives as described earlier under sub heading **“Reduction in AT&C losses”**
3. To introduce modern technologies to monitor reliable supply like sub-station automation, adequate communication infrastructure, GIS, Reliability, Centralized Network Analysis and Planning Tools, SAP driven ERP systems, DMS (Distribution Management Systems), OMS (Outage Management System), etc.
4. State would take necessary steps to meet the Performance Standards specified by PERC. Proper mechanism of monitoring Key Performance Index (KPI) as described under sub heading “Performance Monitoring Mechanism” needs to be provided.
5. To make arrangement of balance funds after approval of ongoing schemes of GOI like DDUGJY and IPDS

GOI Intervention

To approve the whole amount of the projects under DDUGJY & IPDS.

Renewable energy is increasingly becoming an important source of the energy mix –meeting the twin objectives of energy security and clean energy considerations. Punjab has good potential for promotion and development of renewable and non conventional energy projects, particularly Solar, Biomass / Bagasse and Mini Hydel Projects. Good explorable options and potential exists for power generation from irrigation canal drops, solar including solar PV on canal top, biomass cogeneration etc. State has already issued liberal policies for promotion of renewable energy generation.

Government of Punjab is keen to tap renewable power potential of the state to meet the growing demand of power in an environmental friendly and sustainable manner. The area of studies are:

- Renewable energy plan especially for Solar, Biomass and Bagasse based power projects
- Grid connected and off grid Roof Top Solar scheme
- Solar water pumping scheme particularly for agricultural consumers
- Action plan of the state
- Fund Requirements
- GoI/ State Govt Interventions

Grid Connected Renewable Energy:

The total grid connected Renewable Energy (RE) installed capacity against PEDAs and other NRSE projects (consisting of solar, baggage / biomass, Small hydel etc.) as on 31.03.15 is given in Table 8.1 below:

Table-8.1

Sl. No.	Source		Total Capacity as on 31.03.2015 (MW)
1.0	INSTALLED CAPACITY (MW)		
1.1	Installed capacity against Power Purchase	Long Term	552.22
		Short Term	---
1.2	Installed capacity of PSPCL own hydel NRSE Projects (MW)		96.95
TOTAL INSTALLED CAPACITY (MW)			648.82*
2.0	PSPCL SHARE (MW)		
2.1	PSPCL share against Power Purchase (MW)	Long Term	484.00
		Short Term	----
2.2	Installed capacity of PSPCL own hydel NRSE Projects (MW)		96.95
TOTAL PSPCL CAPACITY (Share + Own)			580.95*

Note: * This capacity includes 10 MW of Jalkheri Biomass and 1.5 MW (Daudhar), 0.8 MW (Nidampur), 0.8 MW (Nidampur), 0.8 MW (Thuhi) and 0.8 MW (Rohti) Micro Hydel Project.

The potential of generation of power through Renewable Energy Sources in Punjab state is estimated to be about 7500 MW (as per MNRE 6768MW) as indicated in Table 8.2 below:

Table-8.2

Sl. No.	Type	Estimated Potential (as per State)	Estimated Potential (As per MNRE)
1	Solar	5000	2810
2	Bagasse based cogeneration	1000	300
3	Biomass based power generation	1000	3172
4	Small Hydro Projects	400	441
5	Waste to energy	100	45
	TOTAL	7500 MW	6768 MW

Policy and notifications in place

Various 'New and Renewable Energy Policies' are already in place in Punjab. The policies notified by GoP and PSERC are as described below:

- a) "New and Renewable Sources of Energy (NRSE) Policy – 2012" (Vide Govt. of Punjab Notification no. 10/174/2012/STE(3)/4725 dated 26.12.2012).
- b) "Policy on Net Metering for Grid Interactive Roof Top Solar Photo Voltaic Power plants" (Vide Govt. of Punjab Notification no. 18/7/2014-PE1/3706 dated 05.11.2014).
- c) "Punjab State Electricity Regulatory Commission (Renewable Purchase Obligation and its compliance) Regulations, 2011" Vide PSERC notification no. PSERC/Secy./Re./55 dated 03.06.2011.
- d) "Punjab State Electricity Regulatory Commission (Renewable Purchase Obligation and its compliance) Regulations, 2015" Vide PSERC notification no. PSERC/Secy./Reg./100 dated 06.05.2015.

For further promoting generation through NRSE, GoP has also come out with many notifications with respect to exemptions of taxes & duties, with respect to land use, etc.

Government of Punjab Initiatives and Plan

Punjab Energy Development Agency (PEDA) is the State Nodal Agency for promotion and development of Renewable Energy projects and the State designated agency for the implementation of Energy Conservation Act, 2001. PEDA is also the State agency for Renewable Energy Certificates (REC) accreditation under the notification by PSERC in accordance with the REC Regulation of CERC.

Following strategic initiatives have been taken:

- a) To create conducive conditions for attracting private sector investment in NRSE projects along with broader participation by public community / civil society.
- b) To provide decentralized renewable energy for agriculture, industry, commercial and household sectors particularly in rural areas thereby improving the quality of power and reducing transmission and distribution losses.
- c) To give support to specific NRSE projects and schemes for generating energy and conserving energy through energy efficiency.
- d) To support research, development, and commercialization of new and emerging technologies in RE sector such as fuel cell, hydrogen and chemical energy, alternative fuels for transportation use, etc.
- e) To use agricultural waste and cattle dung for the production of bio fuel.
- f) To create awareness through work shop / seminars, energy audits and demo projects in order to promote energy efficiency in different sectors of the economy in the state.

Punjab facilitates setting up of RE projects on Build, Own and Operate basis under the NRSE Policy 2012. Valuable incentives are provided to the interested developers to invest and set up RE projects in the state.

RENEWABLE PURCHASE OBLIGATION (RPO):

Every obligated entity (distribution licensee(s), captive users, open access customers etc.) shall purchase electricity from RE sources including solar, not less than a percentage specified by PSERC from time to time. As per notification dated 06.05.15, the specified minimum percentage are given in Table below:



Table -8.3

Year	FY2015 -16	FY2016 -17	FY2017 - 18	FY2018 - 19	FY2019 - 20
Non Solar RPO (%)	3.9	4.1	4.2	4.3	4.5
Solar RPO (%)	1.0	1.3	1.8	2.2	2.5
Total RPO (%)	4.9	5.4	6.0	6.5	7.0

“INVEST PUNJAB” is a GoP initiative which is a one stop system for all State level regulatory and fiscal clearances for investors. It ensures smooth approvals for projects from proposal stage up to completion stage. Potential investors have minimum interaction with individual government departments and INVEST PUNJAB is the single point of contact for the investors.

Against tender, PEDA has shortlisted the successful Bidders of Rooftop Solar Power Plant (on BOO basis) for aggregate capacity of 53 MW.

PEDA has also shortlisted successful bidders in RFP for 250 MW Solar power projects under

Phase – II and has issued the LOAs also on 25.02.15 as follows:

- Category – I (1 – 4 MW) : LOAs issued to 16 bidders – Aggregate capacity 29 MW.
- Category – II (5 – 24 MW) : LOAs issued to 5 bidders – Aggregate capacity 100 MW.
- Category – III (25 – 50 MW) : LOAs issued to 3 bidders – Aggregate capacity 100 MW.

Year Wise Availability (Cumulative) through proposed capacity addition plan - through renewable (grid interactive) is as follows:

Table-8.4

Sl. No.	NRSE Projects	Year wise Availability (Cumulative) - In MW				
		Installed Capacity as on March 2015	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
1	Solar **	224.27	724.27	1474.27	2224.27	2824.27
2	MHP	35.05	50.05	59.85	65.85	68.35
3	Biomass	62.5	82.5	102.5	122.5	152.5
4	Co-gen *	162.18	172.18	190.18	210.18	225.18
5	PSPCL own Hydel NRSE projects	96.95	96.95	96.95	96.95	96.95
Total Expected MWs		580.95	1125.95	1923.75	2719.75	3367.25

* Project capacity for which PPA has been signed with PSPCL for sale of surplus power after self consumption.

** Excluding solar roof top.

Action Plan of the State for Grid Interactive NCE/RNES Plants:

The state has to ensure completion and addition of renewable generating capacities in the State of Punjab as per the following roll out plan:

Table -8.5

Sl. No.	NRSE Projects	Year wise Addition of Capacity (MW)				Total (MW)
		FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
1	Solar PV	500	750	750	600	2600
2	Mini Hydro Projects	15	9.80	6	2.5	33.30
3	Biomass	20	20	20	30	90
4	Co-gen*	10	18	20	15	63
Total		545	797.8	796	647.5	2786.3

* Project capacity for which PPA has been signed with PSPCL for sale of surplus power after self consumption.



Table-8.6**Fund Requirement**

Sl. No.	NRSE Projects	Year wise Fund Requirement (Rs. in Crores)				Total (Rs in Cr.)
		FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
1	Solar PV	4000	6000	6000	4800	20800
2	Mini Hydro Projects	90	58.8	36	15	199.8
3	Biomass	110	110	110	165	495
4	Co-gen	55	99	110	82.5	346.5
	Total	4255	6267.8	6256	5062.5	21841.3

Viability Gap Funding (VGF): PEDAs have invited offers for setting up of Grid Connected Solar PV Power Plants on Canal Tops. Nine (9) canals have been identified with capacity aggregating to 20 MW. The project is to be executed with CFA of 30% of Project Cost up to Rs. 3.0 Crores per MW (Already sanctioned).

Intervention by Govt. of Punjab :

- GoP may submit their proposal to MNRE for VGF funding as per norms of the scheme.
- Set up single window clearances mechanism to expedite clearances of NCE / RNES projects.
- To provide solar energy generation based rebate in electricity bills for motivating consumers to install solar power plants.

Intervention by GOI :

- Viability Gap Funding (VGF) as applicable for various Solar Projects in the State.
- Target shall be allotted in programme mode instead of project mode at the start of the financial year.
- Subsidy for development of Green Corridor from NCEF.

Renewable Energy Initiatives of Govt. of Punjab at Consumer Level:**Grid connected and Off Grid Roof Top Solar Scheme:****PEDA - INITIATIVES REQUIRED TO BE TAKEN:**

- Off grid Rooftop Solar Power Plant at Govt. buildings may be implemented in the State

by Renewable Energy Department / PEDAs. 1KWp solar rooftop power plant at residences and commercial buildings may be also proposed to be implemented by FY 2018 -19.

- Rooftop SPV power programme may be implemented by FY 2018 -19. At present, 7.5 MW capacity rooftop SPV power plant is installed in Amritsar. Bidders already have been shortlisted for adding another 53 MW through rooftop SPV power programme.
- Installation of Solar Power plant at District Collectorate, Hospital & Circuit Houses of each districts of Punjab may be completed by FY 2018 -19.

Solar water Pumping Scheme

In the State of Punjab there are various pockets where the ground water level is less than 100 feet i.e. river catchment area, Canals etc. Further there is substantial scope of Solar Water Pumping System in the Poly Houses and green houses. So there shall be promotion of solar water pumping system in these areas.

MNRE. GOI provides 30% subsidy on installation of SPV water pumping systems. From FY 2000-01 to FY 2013-14, 1955 Nos. solar water pumps (each of 2 HP capacity) have been installed.

MNRE, GOI has allocated target of 1600 pumps under 30% CFA to Punjab for the FY 2014-15 to be completed upto 30.09.2015.

Punjab Government has allocated Rs. 2.50 Crores for installation of 200 pumps each of capacity 3 HP.



A proposal for installation of 1390 nos. SPV pumps of capacity 3 HP and 5 HP has been submitted to the Department of Agriculture for release of funds under R.K.V.Y. scheme.

PEDA has planned to install 2000 SPV pumps during FY 2015 – 16.

Solar Off-Grid Systems

It is an ongoing scheme of MNRE in which domestic lighting system (DLS) / home lighting system (HLS- Model-II) are being provided to the beneficiaries in rural and urban areas having one solar module of 24 W, 2 LEDs each of 9 W and one battery of 12V, 12Ah capacity. This scheme is having a provision of 30% subsidy

from MNRE, 60% from GOP and balance 10% to be borne by the beneficiary.

The Government buildings, hospitals, Public Health Centres (PHCs), Block offices in rural and semi-urban areas may be proposed to be provided with Solar Off-Grid Systems with battery support.

Proposal for above schemes would be prepared on annual basis and submitted to MNRE for approval. The projected figures of above scheme are mentioned in Table given below:

Table-8.7

Details of Renewable Energy initiatives (Physical & Investment)

Sl. No.	Particulars	Unit	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
A	Grid connected Solar Rooftops		10 MW	240 MW	250 MW	300 MW	800 MW
	Investment required	Rs. Cr.	8	1920	2000	2400	6400
	Subsidy from MNRE	%	As applicable				
B	Solar off-grid systems						
i)	Solar power Plant		1000 kW	1500 kW	2000 kW	2500 kW	7000 kW
	Investment required	Rs. Cr.	9 Cr.	13.5 Cr.	18 Cr.	22.5 Cr.	63 Cr.
	Assistance from MNRE	%	As applicable				
	Assistance from GoP	%	NIL	NIL	NIL	NIL	
ii)	Solar pump systems	No.	2000	N.A.	N.A.	N.A.	---
	Investment required	Rs. Cr.	75 Cr.	N.A.	N.A.	N.A.	----
	Assistance from MNRE	%	As applicable				
	Assistance from GOP	%	As applicable				
	Beneficiary	%	Balance Fund				
iii.	Solar Power Pack (300 W each)	No.	1000	1000	1500	2000	5500
	Investment required	Rs. Cr.	1.5 Cr.	1.5 Cr.	2.25 Cr.	2.75 Cr.	8 Cr.
	Assistance from MNRE	%	As applicable				
	Assistance from GOP	%	NIL	NIL	NIL	NIL	
	Beneficiary	%	Balance Fund				
iv.	Solar Street Lighting	Nos	5000	5000	7000	10000	27000
	Investment required	Rs. Cr.	7.5 Cr.	7.5 Cr.	10 Cr.	13 Cr.	38 Cr.
	Assistance from MNRE	%	As applicable				
	Assistance from GOP	%	NIL	NIL	NIL	NIL	

Sl. No.	Particulars	Unit	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total
	Beneficiary	%	Balance Fund				
v.	Solar Lantern for BPL and SC & ST	Nos.	5000	5000	5000	5000	20000
	Investment required	Rs. Cr.	1 Cr.	1 Cr.	1 Cr.	1 Cr.	4 Cr.
	Assistance from MNRE	%	As applicable				
	Assistance from GOP	%	Balance Fund				

Funding for implementation of above scheme will be met from:

- Central Financial Assistance (CFA) provided from Ministry of New and Renewable Energy, GoI under its various scheme.
- Central Financial Assistance from Ministry of Power, GoI under DDG scheme.
- Grant provided from State Government.
- State Green Energy Fund, if any.
- Various private developers.

Electrification of household through Decentralized Distributed Generation (DDG) under RGGVY

No such proposal is there as Punjab State is fully electrified.

Action PLAN - state –renewable energy

DPRs for above schemes would be prepared and submitted to MNRE for approval on yearly basis.

GOI INTERVENTION

- Capital subsidy under RashtriyaKrishiVikashYojana for solar Pump system.
- The target shall be given on programme mode instead of project mode.
- Central Financial Assistance shall be provided in the beginning of financial year.

With increasing importance being given to low carbon growth these days, the cheapest and more affordable option to overcome the energy deficit is Demand Side Management (DSM) and implementation of energy efficiency measures in various sectors such as agriculture, municipalities, buildings, domestic, industries etc. The DSM has been traditionally seen as a means of reducing peak electricity demand. In fact, by reducing the overall load on an electricity network, DSM has various beneficial effects, including mitigating electrical system emergencies, reducing the number of blackouts and increasing system reliability. Possible benefits can also include reducing dependency on expensive imports of fuel, reducing energy cost, and reducing harmful emissions to the environment.

Finally, DSM has a major role to play in deferring high investments in generation, transmission and distribution networks. Thus DSM applied to electricity systems provides significant economic, reliability and environmental benefits. Opportunities for reducing energy demand are numerous in all sectors and many are low-cost, or even no cost, items that most enterprises or individuals could adopt in the short term, if good energy management is practised.

Based on the available data and load research study conducted at PSCPL the energy saving potential has been calculated.

Table-9.1

Sector	DSM Technique	Energy Savings Potential as % of total energy consumption of respective Sector	Investment (in INR Crores)/MU of savings
Agriculture	Replacement with Energy efficient pump Sets	17%	1.5
Domestic	Replacement of ICLs with LED bulbs	13%	0.8
Commercial building	Retrofitting of Energy efficient equipment	15%	1.5
Public water Works (PWW)	Replacement with Energy efficient pump Sets	10%	0.6
Municipal Street Lighting (MSL)	Replacement of existing street light with LEDs	48%	2.0

Note: * Taxes such as service tax, sales tax, or any other taxes as applicable will be charged on actual basis which is not included in these amounts.

Application of the above provides substantial energy savings per year. In Street lighting, the saving potential is maximum, because in this sector DSM can be planned and implemented by municipal authority. Public water works is a government organization and hence penetration rate is quite high. In other sectors, serious awareness campaign through stakeholders' consultation is required to achieve and enhances the desired energy savings.

Enlisted below are the DSM measures and energy efficiency initiatives to be taken up in the state of Punjab.

- Mandatory use of CFL in Govt building / Govt aided institutions / Boards / Corporations.

- For promotion of Solar water heating system in domestic sector, a rebate of Rs 100/-, Rs 200/- and Rs 300/- per month on electricity bills, to the users of Solar water heaters of capacity 100 LPD, 200 LPD and 300 LPD capacities respectively for a period of 3 years is being given.
- Solar Water Heating System has been made mandatory in industries where hot water is required for processing, hospitals and nursing homes, Govt. hospitals, hotels, motels and banquet halls, jail barracks, canteens, housing complexes set up by Group Housing Societies/Housing Boards, all Residential buildings built on a plot of size 500 sq.yds. and above falling within the limits of

Municipal Committees/ Corporations and HUDA Sectors, all Govt. buildings, Residential Schools, Educational Colleges, Hostels, Technical/Educational Institutes, District Institute of Education and Training, Tourism Complexes and Universities etc.

- Use of 4 star rated pumps have been mandated for agriculture sector. 4 star rated distribution transformer are being used purchased.

Policy and notification in Place

Government of Punjab (GoP) notified policy for energy conservation vide “New and Renewable Sources of Energy (NRSE) policy 2012” (vide GoP notification no. 10/174/2012/STE (3)/4725 dated 26.12.2012.

There is a potential of saving of energy up to 20-25% in different sectors of the economy in the state. Energy Conservation Measures shall be implemented and enforced in the state in accordance with the provisions contained in the Energy Conservation Act-2001 by PED, in consultation with Bureau of Energy Efficiency, Ministry of Power and Government of India.

Punjab has issued notifications for mandatory use of CFL, Roof Top Solar Water Heating Systems, BIS approved & minimum BEE 4 Star labeled pump sets and promotion of energy efficient buildings. Demo projects have been initiated for development of energy efficiency in municipal street lighting, water pumping & existing Govt. buildings. Use of BEE Star Labeled electrical appliances in all government organizations has also been mandated.

Energy Conservation Building Code (ECBC) has been launched by Bureau of Energy Efficiency, MOP, GOI on 27th May, 2007 to be implemented on voluntarily basis. The code is applicable to buildings/ building complexes that have a connected load/ contract demand of 100 kW/ 120 KVA or more and is being amended as the Punjab Energy Conservation Building Code (PECBC) to be applicable in the state of Punjab which falls in the composite climate zone within the provision of the EC Act-2001. Three types of Green building rating are also available i.e.

Leadership in Energy and Environmental Design (LEED), Green Rating for Integrated Habitate Assessment (GRIHA) & BEE Star Rating of Buildings.

An energy conservation action plan team has been constituted under the chairmanship of Principal Secretary, Science & Technology, Environment and NCES which reviews implementation of various energy conservation programmes in the State.

Interventions

The agricultural sector accounted for about 26% of the state's energy consumption during 2013-14. There is substantial saving potential (up to 1650 MUs) exists in this sector through replacement programmes by energy efficient pumps. However, actual potential of savings in the state on account of DSM can be ascertained only after completion of DSM plan for state. Punjab has already signed MOU with BEE dated 12.06.2014 under capacity building programme of Ministry of Power.

Domestic sector accounted for about 28% of the state's energy consumption during 2013-14. In order to stimulate investments in energy efficient lighting projects, high quality LED lamps are proposed to be given to households at the cost of incandescent lamps (ICLs) to encourage them to invest in energy efficiency under the Domestic Efficient Lighting Program (DELP).

The Domestic Efficient Lighting Programme (DELP) seeks to promote high quality LED lighting in the domestic sector by overcoming the high first cost barrier. DELP will enable sale of LED bulbs from designated places at a cost that is much less than the market price of Rs. 350-450 as replacements of Incandescent

DELP KEY FEATURES

- LED at cost of Rs. 95-105 as against a market price of Rs 350-450
- Consumer take LED bulb at Rs. 10/-, Balance paid by DISCOM from energy savings or by consumer in 8-12 months installment.
- 3 years free replacement warranty
- No impact on tariff
- Total upfront investments by EESL
- Benefits sharing approach



Lamps (ICLs). The programme will reduce installed load approximately by 204 MW as shown in Table-9.2 and will lead to approximate annual energy consumption reduction of the state by more than 313 million KWh. The saved energy can be sold to better paying consumers like Industry and Commercial, which will provide additional revenue stream to the state utility.

ICLs are extremely energy inefficient form of lighting. In contrast, LEDs consume a fraction of energy used by ICLs to provide better light output. A single LED outlasts about 20-30 ICLs, and hence on life cycle cost effectiveness it fares

better than ICL and CFL. However, the penetration of LEDs is very low because of their high first cost. To overcome this barrier, Energy Efficiency Services Limited (EESL), has been implementing programmes in several states to provide high quality LEDs as replacements to ICLs and CFLs at a cost of Rs. 95-105 each to residential consumers.

EESL, procures the LEDs bulbs and provides to consumers at an initial rate of Rs. 10 each (balance by DISCOM from energy savings or by consumer in installment) as against their market price of Rs. 350-450.

Table-9.2

Estimated Number of Household targeted	58 Lacs
No. of inefficient ICLs to be replaced in domestic sector only	53 Lacs
Total reduction of connected load in the state	204 MW
Total energy consumption reduction in the state	330 million KWh
Energy bill reduction for households per annum	Rs. 300-400
Average cost reduction for DISCOMS per annum	Rs. 146 Crore
Upfront investment by State/ DISCOM	Nil
Total Program Investment by EESL/ Lighting companies*	Rs. 64 Crore
Recovery of cost	1. DISCOM Repayment 2. Consumer Repayment

Note: * Taxes such as service tax, sales tax, or any other taxes as applicable will be charged on actual basis which is not included in these amounts.

EESL will make / arrange the upfront investment estimated at Rs. 64 Crore for procurement, transportation, distribution of 53 Lakh LED to domestic households in the state.

Measures already taken by state and indication savings observed :

- Domestic Sector** :44.51 MU through "Batchat Lamp Yojna (BLY) scheme.
- Agriculture sector** : 55.88 MU through mandatory use of BEE 4 star rated Agriculture Pumpset and ban on use of ICL's at the Agricultural Kothas respectively.
- Commercial Sector** : 0.3 MU through replacement of 1982 make inefficient ACs at GGSSTP – Ropar.

Approach / Strategy

All the above interventions involve replacement of inefficient equipment / appliances with energy efficient ones for the

agriculture, domestic, commercial buildings and municipalities. **These can be undertaken by the State Government at no upfront cost by using the Energy Service Company (ESCO) model.** The model is based on the concept of promoting Performance Contract mode where the company invests in any project by entering into a contract agreement with the facility owner which is recovered through the savings accrued due to reduced electricity bills.

Actions Points

The sector-wise Central Government and State Government actions envisaged to facilitate implementation of energy efficiency measures as mentioned above are detailed below:



Central Government

- BEE may consider formulation of specification for LED bulbs and introducing star label scheme for LED bulbs.
- Energy Efficiency Services Limited (EESL) to take up project design and project development.

State Government

- Distribution Companies / Utilities may file DSM petition with Punjab Electricity Regulatory Commission for getting sanction of the proposed DSM plan.
- Ensure formulation of a detailed time line in consultation with concerned departments like Distribution Companies for implementation of energy efficiency measures in municipalities.
- Ensure establishment of a payment security mechanism so that the company making investments under the ESCO mode recovers the same through the savings accrued due to reduced electricity bills.

Central Government

- BEE may provide technical support for effective enforcement of ECBC and promotion of ESCO based retrofitting works in Government buildings. BEE can provide support for capacity building of state department through establishment of ECBC cells for compliance of ECBC and retrofitting in Government buildings.
- Energy Efficiency Services Limited (EESL) to take up project design and project development for retrofitting in commercial buildings.

State Government

- Government of Punjab has to adopt ECBC Directives for new commercial building design and mandated energy audit of existing commercial building once in a three-year period. Effective enforcement of ECBC compliance and mandating retrofitting in energy-audited buildings may result in reduction of electrical consumption from commercial sector. Government of Punjab may consider mandatory retrofitting in Government buildings with an objective of reduction of electricity bills, which state government is paying against electricity bill of these buildings. This would also demonstrate impact of ESCO based retrofitting projects to private building owners to adopt the same.
- As per the Planning Commission's projection; residential building are becoming one of the larger consumers of electricity in the country by 2030. BEE is introducing design guidelines for energy efficient multi storey residential apartments including in the composite and hot & dry climatic zone. State Government may mandate compliance of these guidelines through institutional framework in the state.
- For residential buildings, the state could adopt the star labeling scheme for multi-storey residential apartment buildings, being prepared by BEE.

In addition to the above, Punjab Electricity Regulatory Commission (RERC) may be requested to issue directives for creation of DSM funds by DISCOMs / Utilities of the State so that DSM activities can get extra emphasis. Such funds can be utilized for meeting incremental cost of efficiency improvement.



Financial Position of Punjab

PSPCL is combined utility for generation and distribution of power in whole of Punjab. Audited financial statement was made available up to FY 2012-13 while provisional financial statement for FY 2013-14 was available. Based on these statements, present financial position for PSPCL has been analysed and mentioned as hereunder :

After unbundling of the erstwhile Punjab State Electricity Board (PSEB) in April 2010, PSPCL incurred loss of Rs. 1639.76 Crores in the first year of operation i.e. FY 2010-11, which decreased to Rs. 537 Crore in 2011-12. However, PSPCL has made profit of Rs. 261 Crores and Rs. 256 Crores (provisional) in the year 2012-13 and 2013-14 respectively. Accumulated losses as on 31.03.2014 is Rs. 1660 Crores. Revenue from sale of power has increased from Rs. 13966 Crores in FY 2012-13 to Rs. 16235 Crores (provisional) in FY 2013-14.

Financial Viability

Based on the road map discussed in the previous chapters, various scenarios have been prepared to visualize the profitability from operating the business as per the roadmap laid down and sensitivity thereof with changes in important input parameters like tariff and AT&C losses. However, the analysis has been restricted up to FY 2018-19 being the analysis framework for 24x7 PFA initiatives.

The following scenarios have been detailed in subsequent sections:

- At targeted growth rate as per “24x7 Power for All” Road Map (Base case).
- Same as (a) and tariff hikes for viability, if required
- Non-Adherence to AT & C Loss Reduction Trajectory and subsequent dependence on higher tariff hike for viability.

- At targeted growth and loss reductions as per roadmap and all fundings including those under GOI schemes as per Debt equity ratio of 70:30.

Common Assumptions

- Average cost of power purchase considered as Rs. 4.43 per unit excluding intrastate transmission charges of 0.19 paise/unit. The details are given as hereunder:

Table-10.1

Sl. No.	Description	Total	Reference
1.	Energy purchased (MU)	25181.0	Tariff Order-2015-16 (PSERC)
2.	Purchase cost (Cr. Rs.) incl. PGCIL Charges	11147.06	Tariff order 2015-16 PSERC
3	Per Unit purchase Cost (Rs/kWh)	4.43	
6.	Intra state transmission charges Rs/kWh)	0.19	Tariff order FY 2015-16 for PSTCL

- No change in power purchase cost and generation cost, as any change in the power purchase cost will be taken care by the Fuel and Power Purchase Cost Adjustment mechanism;
- Escalation towards R&M cost (excl employees cost) and administrative and General expenses has been considered @ 6% p.a. in line with average changes in WPI. Escalation towards Employee Cost and Administration & General escalation considered @ 8% p.a. based on weighted average of WPI & CPI Indices (PSERC Notification 15th, October, 2015). The indices are tabulated are hereunder :



Table-10.2

Month/ Year	WPI Indices	CPI Indices
Average FY 2012-13	168	215
Average FY 2013-14	178	236
Increase	5.95%	9.8%
Say	6.0%	10%
Weighted Average of WPI & CPI (50%:50%)	8%	

Source: eaindstry.gov.in & PSERC notification- 15th, October, 2015

4. Purchase Demand considered as forecasted in previous chapters
5. Grant, Loan and Equity on Govt. sponsored scheme are calculated as per guidelines/policy of respective scheme.
6. Interest computation has been done as per the existing loan profiles of PSPCL. Interest on future long term loan has been calculated @ 12% p.a.
7. The existing average billing rate was Rs 5.12/kWh in FY 2013-14 based on tariff order for FY 2013-14. From FY 2015-16 to FY 2018-19, the average billing rate has been derived from approved tariff order of FY 2015-16 (ref table no. 7.2, page no. 180). Subsidy received from GoP is

included in revenue from sale of power. The weighted average ABR is shown hereunder:

Table-10.3

Year	Rs./kWh
FY 2015-16	5.66
FY 2016-17	5.65
FY 2017-18	5.65
FY 2018-19	5.65

The details of wt average billing rate is given in Annexure-XI.

8. The interstate sale of surplus energy has been considered at the rate of 3.00 Rs/kWh. Average rate for sale of power through power trading exchange is in the range of Rs 2-4/kWh, hence an average of 3/kWh has been adopted.
9. Depreciation has been computed @ average 3.76% for existing assets and 5.28% for new incoming assets.
10. Escalation towards Meter Rent & Other Receipts has been considered @ 2.92% p.a. on previous year figure of annual accounts as per CAGR of no. of electrified households and other income considered growing @ 5.0% p.a.
11. Receivable against supply of power has been projected @ 2 months level.
12. Liabilities for purchase of power has been considered as 2 month of power purchase.
13. Collection efficiency has been assumed as 100%.



Scenario-A: At targeted growth rates as per the 24x7 Road Map (Base case)

Assumptions

- ✓ No tariff hike and change in power purchase cost
- ✓ T&D losses, AT&C losses and Collection Efficiency as per targeted trajectory.

Table-10.4A

Financial Position of the Utilities (Scenario A)

(In Rs. Crores)

PUNJAB						
Assumptions		SCN-A				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Total unrestricted annual energy requirement (Consumer end)	MU	43,918	47,752	51,937	56,511
2	Requirement at state periphery (Grossed up)	MU	52,383	56,620	61,214	66,483
3	AT & C Losses(As per agreed trajectory)	%	14.01%	13.50%	12.98%	12.82%
4	Collection efficiency	%	100.0%	100.0%	100.0%	100.0%
5	T&D Losses	%	16.16%	15.66%	15.16%	15.00%
6	Energy availability (MU)		71,654	84,203	89,345	91,219
7	State's own generation		26,148	26,148	26,148	26,148
8	Power purchase cost	Rs/Unit	4.43	4.43	4.43	4.43
9	Purchased power	MU	45,506	58,055	63,197	65,071
10	Average billing rate	Rs/Unit	5.66	5.65	5.65	5.65
11	Tariff increase	%	0.0%	0.0%	0.0%	0.0%
12	Effective Average billing rate	Rs/Unit	5.66	5.65	5.65	5.65
13	Surplus energy sold to other states	MU	19,271	27,583	28,131	24,736
Expense						
1	Employ cost escalation	%	8%	8%	8%	8%
2	Repair & Maintenance escalation	%	6%	6%	6%	6%
3	Administrative & General escalation	%	8%	8%	8%	8%
Financial position of Utility -		SCN-A				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Net sales-Power	Rs Cr	30,639	35,255	37,784	39,349
2	Meter rent,theft recov etc	Rs Cr	943	971	999	1,028
3	Other Income (Intt., DPS etc.)	Rs Cr	796	835	877	921
Total Income			32,378	37,061	39,660	41,298
Expenditure						
4	Transmission charges @ 0.19/unit	Rs Cr	995	1,076	1,163	1,263
5	Power Purchase	Rs Cr	20,159	25,718	27,996	28,826
6	Generation cost	Rs Cr	5,160	5,160	5,160	5,160
7	Employee cost	Rs Cr	4,541	4,904	5,296	5,720
8	R & M Cost	Rs Cr	441	468	496	526
9	Admn. & General expenses	Rs Cr	145	157	169	183
10	Others	Rs Cr	-	-	-	-
Total Expenses			31,441	37,483	40,281	41,678
11	Gross Profit	Rs Cr	936	(422)	(621)	(379)
12	Interest	Rs Cr	2,499	2,646	3,265	3,971
13	Depreciation	Rs Cr	975	1,144	1,329	1,469
14	Profit before tax	Rs Cr	(2,538)	(4,212)	(5,214)	(5,819)
15	Tax	Rs Cr	-	-	-	-
Net Profit after taxes			(2,538)	(4,212)	(5,214)	(5,819)



Table-10.4B

Cash-flow statement				
				(Rs.in Cr.)
Description	2015-16	2016-17	2017-18	2018-19
Cash inflow				
-Grants	5	169	602	466
-Equity	671	673	872	1,032
-Long term loans-Govt.	2,338	2,359	1,629	1,941
-Profit before Tax	(2,538)	(4,212)	(5,214)	(5,819)
-Depreciation	975	1,144	1,329	1,469
-Interest	2,499	2,646	3,265	3,971
-Bank borrowings for working capital	557	613	674	742
-Security deposit from consumers	-	-	-	-
-Deposit for Electrification, Service Connection etc.	-	-	-	-
Short term borrowings	419	4,738	9,999	16,058
Total Cash inflow	4,927	8,129	13,156	19,860
Cash outflow				
-capital expenditure	3,014	3,200	3,103	3,439
-Loan repayments	2,289	2,289	2,289	2,623
-Repayment of short term borrowings	-	419	4,738	9,999
-Interest payouts	2,499	2,591	2,649	2,671
-Increase in working capital	(204)	(425)	(239)	(173)
-Interest on short term borrowings	-	54	616	1,300
-Tax	-	-	-	-
Total cash outflow	7,598	8,129	13,156	19,860
Net cash inflow	(2,672)	-	-	-
Opening cash balance from previous year	2,672	-	-	-
Closing cash balance	-	-	-	-

Based on the above figures, it is evident that if PSPCL adheres to the target electrification and reduction of T&D losses as per agreed trajectory, financial losses would be there.

Scenario B: At Targeted Growth Rate as per 24x7 Road Map plus Financial Turnaround

Assumptions

- ✓ Power purchase cost constant for all the years.
- ✓ T&D losses, AT&C losses and Collection Efficiency as per targeted trajectory.

Financial Position of the Utilities (Scenario B)

Table-10.5A

(In Rs. Crores)

Assumptions		SCN-B				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Total unrestricted annual energy requirement (Consumer end)	MU	43,918	47,752	51,937	56,511
2	Requirement at state periphery (Grossed up)	MU	52,383	56,620	61,214	66,483
3	AT & C Losses(As per agreed trajectory)	%	14.01%	13.50%	12.98%	12.82%
4	Collection efficiency	%	100.0%	100.0%	100.0%	100.0%
5	T&D Losses	%	16.16%	15.66%	15.16%	15.00%
6	Energy availability (MU)		71,654	84,203	89,345	91,219
7	State's own generation		26,148	26,148	26,148	26,148
8	Power purchase cost	Rs/Unit	4.43	4.43	4.43	4.43
9	Purchased power	MU	45,506	58,055	63,197	65,071
10	Average billing rate	Rs/Unit	5.66	5.65	5.65	5.65
11	Tariff increase	%	0.0%	6.0%	5.0%	5.0%
12	Effective Average billing rate	Rs/Unit	5.66	5.99	6.29	6.60
13	Surplus energy sold to other states	MU	19,271	27,583	28,131	24,736
Expense						
1	Employ cost escalation	%	8%	8%	8%	8%
2	Repair & Maintenance escalation	%	6%	6%	6%	6%
3	Administrative & General escalation	%	6%	6%	6%	6%
Financial position of Utility -		SCN-B				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Net sales-Power	Rs Cr	30,639	36,873	41,100	44,734
2	Meter rent,theft recov etc	Rs Cr	943	971	999	1,028
3	Other Income (Intt., DPS etc.)	Rs Cr	796	835	877	921
Total Income			32,378	38,679	42,976	46,683
Expenditure						
4	Transmission charges @ 0.19/unit	Rs Cr	995	1,076	1,163	1,263
5	Power Purchase	Rs Cr	20,159	25,718	27,996	28,826
6	Generation cost	Rs Cr	5,160	5,160	5,160	5,160
7	Employee cost	Rs Cr	4,541	4,904	5,296	5,720
8	R & M Cost	Rs Cr	441	468	496	526
9	Admn. & General expenses	Rs Cr	145	157	169	183
10	Others	Rs Cr	-	-	-	-
Total Expenses			31,441	37,483	40,281	41,678
11	Gross Profit	Rs Cr	936	1,197	2,695	5,005
12	Interest	Rs Cr	2,499	2,646	3,090	3,379
13	Depreciation	Rs Cr	975	1,144	1,329	1,469
14	Profit before tax	Rs Cr	(2,538)	(2,593)	(1,723)	158
15	Tax	Rs Cr	-	-	-	55
Net Profit after taxes			(2,538)	(2,593)	(1,723)	103

Table-10.5B

Cash-flow statement				
				(Rs.in Cr.)
Description	2015-16	2016-17	2017-18	2018-19
Cash inflow				
-Grants	5	169	602	466
-Equity	671	673	872	1,032
-Long term loans-Govt.	2,338	2,359	1,629	1,941
-Profit before Tax	(2,538)	(2,593)	(1,723)	158
-Depreciation	975	1,144	1,329	1,469
-Interest	2,499	2,646	3,090	3,379
-Bank borrowings for working capital	557	613	674	742
-Security deposit from consumers	-	-	-	-
Deposit for Electrification, Service Connection etc.	-	-	-	-
Short term borrowings	419	3,389	5,442	5,923
Total Cash inflow	4,927	8,398	11,915	15,109
Cash outflow				
-capital expenditure	3,014	3,200	3,103	3,439
-Loan repayments	2,289	2,289	2,289	2,623
-Repayment of short term borrowings	-	419	3,389	5,442
-Interest payouts	2,499	2,591	2,649	2,671
-Increase in working capital	(204)	(155)	44	172
-Interest on short term borrowings	-	54	441	707
-Tax	-	-	-	55
Total cash outflow	7,598	8,398	11,915	15,109
Net cash inflow	(2,672)	-	-	-
Opening cash balance from previous year	2,672	-	-	-
Closing cash balance	-	-	-	-

Based on the above figures, it is evident that if financial losses observed in Scenario-A are to be neutralized then, nominal Tariff Hike of 6.0% in FY 2016-17, 5.0% in FY 2017-18 and 5.0 % in FY 2018-19 on average Billing rate of Rs. 5.65 per unit from FY 2016-17 to FY 2017-18 would be required for financial sustainability.

Scenario C: Non-Adherence to Performance Parameters (Loss Reduction Trajectory) and subsequent dependence on Higher Tariff Hike for viability.

ASSUMPTIONS

- AT&C losses higher by 1% than the targeted trajectory.
- All other assumptions same as in Base case

Table-10.6A**Financial Position of the Utilities (Scenario C)****(In Rs. Crores)**

PUNJAB						
Assumptions		SCN-C				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Total unrestricted annual energy requirement (Consumer end)	MU	43,918	47,752	51,937	56,511
2	Requirement at state periphery (Grossed up)	MU	52,999	57,282	61,926	67,255
3	AT & C Losses(As per agreed trajectory)	%	15.01%	14.50%	13.98%	13.82%
4	Collection efficiency	%	100.0%	100.0%	100.0%	100.0%
5	T&D Losses	%	17.13%	16.64%	16.13%	15.97%
6	Energy availability (MU)		71,654	84,203	89,345	91,219
7	State's own generation		26,148	26,148	26,148	26,148
8	Power purchase cost	Rs/Unit	4.43	4.43	4.43	4.43
9	Purchased power	MU	45,506	58,055	63,197	65,071
10	Average billing rate	Rs/Unit	5.66	5.65	5.65	5.65
11	Tariff increase	%	0.0%	0.0%	0.0%	0.0%
12	Effective Average billing rate	Rs/Unit	5.66	5.65	5.65	5.65
13	Surplus energy sold to other states	MU	18,655	26,921	27,419	23,964
	Expense					
1	Employ cost escalation	%	8%	8%	8%	8%
2	Repair & Maintenance escalation	%	6%	6%	6%	6%
3	Administrative & General escalation	%	8%	8%	8%	8%
	Financial position of Utility -	SCN-C				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Net sales-Power	Rs Cr	30,454	35,056	37,570	39,118
2	Meter rent,theft recov etc	Rs Cr	943	971	999	1,028
3	Other Income (Intt., DPS etc.)	Rs Cr	796	835	877	921
	Total Income		32,193	36,862	39,446	41,067
	Expenditure					
4	Transmission charges @ 0.19/unit	Rs Cr	1,007	1,088	1,177	1,278
5	Power Purchase	Rs Cr	20,159	25,718	27,996	28,826
6	Generation cost	Rs Cr	5,160	5,160	5,160	5,160
7	Employee cost	Rs Cr	4,541	4,904	5,296	5,720
8	R & M Cost	Rs Cr	441	468	496	526
9	Admn. & General expenses	Rs Cr	145	157	169	183
10	Others	Rs Cr	-	-	-	-
	Total Expenses		31,453	37,495	40,294	41,693
11	Gross Profit	Rs Cr	740	(633)	(848)	(626)
12	Interest	Rs Cr	2,499	2,699	3,353	4,099
13	Depreciation	Rs Cr	975	1,144	1,329	1,469
14	Profit before tax	Rs Cr	(2,734)	(4,477)	(5,529)	(6,193)
15	Tax	Rs Cr	-	-	-	-
	Net Profit after taxes		(2,734)	(4,477)	(5,529)	(6,193)

Table-10.6B

Cash-flow statement				
				(Rs.in Cr.)
Description	2015-16	2016-17	2017-18	2018-19
Cash inflow				
-Grants	5	169	602	466
-Equity	671	673	872	1,032
-Long term loans-Govt.	2,338	2,359	1,629	1,941
-Profit before Tax	(2,734)	(4,477)	(5,529)	(6,193)
-Depreciation	975	1,144	1,329	1,469
-Interest	2,499	2,699	3,353	4,099
-Bank borrowings for working capital	557	613	674	742
-Security deposit from consumers	-	-	-	-
Deposit for Electrification, Service Connection etc.	-	-	-	-
Short term borrowings	829	5,410	10,984	17,414
Total Cash inflow	5,140	8,590	13,914	20,969
Cash outflow				
-capital expenditure	3,014	3,200	3,103	3,439
-Loan repayments	2,289	2,289	2,289	2,623
-Repayment of short term borrowings	-	829	5,410	10,984
-Interest payouts	2,499	2,591	2,649	2,671
-Increase in working capital	(196)	(427)	(242)	(176)
-Interest on short term borrowings	-	108	703	1,428
-Tax	-	-	-	-
Total cash outflow	7,607	8,590	13,914	20,969
Net cash inflow	(2,466)	-	-	-
Opening cash balance from previous year	2,466	-	-	-
Closing cash balance	-	-	-	-

The scenario exhibits that if PSPCL does not adhere to the committed AT&C loss reduction trajectory by 1% then, nominal Tariff Hike of 6% in FY 2016-17, 6.0% in 2017-18 and 5.0% in 2018-19 on average Billing rate of Rs. 5.65 per unit from FY 2016-17 to FY 2018-19 would be required for financial sustainability.

Scenario D: All the fundings including those by GOI as per Debt : Equity ratio of 70:30

ASSUMPTIONS

- All schemes finance as per D:E Ratio of 70:30.
- All other assumptions same as in Base case

Table-10.7A

Scenario-D

(In Rs. Crores)

Assumptions		SCN-D				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Total unrestricted annual energy requirement (Consumer end)	MU	43,918	47,752	51,937	56,511
2	Requirement at state periphery (Grossed up)	MU	52,383	56,620	61,214	66,483
3	AT & C Losses(As per agreed trajectory)	%	14.01%	13.50%	12.98%	12.82%
4	Collection efficiency	%	100.0%	100.0%	100.0%	100.0%
5	T&D Losses	%	16.16%	15.66%	15.16%	15.00%
6	Energy availability (MU)		71,654	84,203	89,345	91,219
7	State's own generation		26,148	26,148	26,148	26,148
8	Power purchase cost	Rs/Unit	4.43	4.43	4.43	4.43
9	Purchased power	MU	45,506	58,055	63,197	65,071
10	Average billing rate	Rs/Unit	5.66	5.65	5.65	5.65
11	Tariff increase	%	0.0%	0.0%	0.0%	0.0%
12	Effective Average billing rate	Rs/Unit	5.66	5.65	5.65	5.65
13	Surplus energy sold to other states	MU	19,271	27,583	28,131	24,736
Expense						
1	Employ cost escalation	%	8%	8%	8%	8%
2	Repair & Maintenance escalation	%	6%	6%	6%	6%
3	Administrative & General escalation	%	6%	6%	6%	6%
Financial position of Utility -		SCN-D				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Net sales-Power	Rs Cr	30,639	35,255	37,784	39,349
2	Meter rent,theft recov etc	Rs Cr	943	971	999	1,028
3	Other Income (Intt., DPS etc.)	Rs Cr	796	835	877	921
Total Income			32,378	37,061	39,660	41,298
Expenditure						
4	Transmission charges @ 0.19/unit	Rs Cr	995	1,076	1,163	1,263
5	Power Purchase	Rs Cr	20,159	25,718	27,996	28,826
6	Generation cost	Rs Cr	5,160	5,160	5,160	5,160
7	Employee cost	Rs Cr	4,541	4,904	5,296	5,720
8	R & M Cost	Rs Cr	441	468	496	526
9	Admn. & General expenses	Rs Cr	145	157	169	183
10	Others	Rs Cr	-	-	-	-
Total Expenses			31,441	37,483	40,281	41,678
11	Gross Profit	Rs Cr	936	(422)	(621)	(379)
12	Interest	Rs Cr	2,499	2,653	3,287	4,059
13	Depreciation	Rs Cr	975	1,149	1,354	1,522
14	Profit before tax	Rs Cr	(2,538)	(4,224)	(5,262)	(5,960)
15	Tax	Rs Cr	-	-	-	-
Net Profit after taxes			(2,538)	(4,224)	(5,262)	(5,960)

Table-10.7B

Cash-flow statement				
				(Rs.in Cr.)
Description	2015-16	2016-17	2017-18	2018-19
Cash inflow				
-Grants	-	-	-	-
-Equity	671	729	931	1,032
-Long term loans-Govt.	2,338	2,471	1,748	1,941
-Profit before Tax	(2,538)	(4,224)	(5,262)	(5,960)
-Depreciation	975	1,149	1,354	1,522
-Interest	2,499	2,653	3,287	4,059
-Bank borrowings for working capital	557	613	674	742
-Security deposit from consumers	-	-	-	-
Deposit for Electrification, Service Connection etc.	-	-	-	-
Short term borrowings	423	4,750	10,457	17,070
Total Cash inflow	4,927	8,140	13,190	20,405
Cash outflow				
-capital expenditure	3,014	3,200	3,103	3,439
-Loan repayments	2,289	2,289	2,289	2,623
-Repayment of short term borrowings	-	423	4,750	10,457
-Interest payouts	2,499	2,598	2,670	2,699
-Increase in working capital	(204)	(425)	(239)	(173)
-Interest on short term borrowings	-	55	617	1,359
-Tax	-	-	-	-
Total cash outflow	7,598	8,140	13,190	20,405
Net cash inflow	(2,672)	-	-	-
Opening cash balance from previous year	2,672	-	-	-
Closing cash balance	-	-	-	-

Nominal Tariff Hike of 6% in FY 2016-17, 5.0% in 2017-18 and 5.0% in 2018-19 on average Billing rate of Rs. 5.65 per unit from FY 2016-17 to FY 2018-19 would be required for financial sustainability.

Scenario E: As per UDAY Scheme

ASSUMPTIONS

- State to take over 75.0% of DISCOMs debt as on 30th Sept.' 2015 over two years -50.0% in FY 2015-16 and 25.0% in FY 2016-17.
- Interest rate on balance 25.0% to be charged at 9.0%

Table-10.8A

Financial Position of the State Gov DISCOMs (Scenario E)

(In Rs. Crores)

PUNJAB						
Assumptions		SCN-E				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Total unrestricted annual energy requirement (Consumer end)	MU	43,918	47,752	51,937	56,511
2	Requirement at state periphery (Grossed up)	MU	52,383	56,620	61,214	66,483
3	AT & C Losses(As per agreed trajectory)	%	14.01%	13.50%	12.98%	12.82%
4	Collection efficiency	%	100.0%	100.0%	100.0%	100.0%
5	T&D Losses	%	16.16%	15.66%	15.16%	15.00%
6	Energy availability (MU)		71,654	84,203	89,345	91,219
7	State's own generation		26,148	26,148	26,148	26,148
8	Power purchase cost	Rs/Unit	4.43	4.43	4.43	4.43
9	Purchased power	MU	45,506	58,055	63,197	65,071
10	Average billing rate	Rs/Unit	5.66	5.65	5.65	5.65
11	Tariff increase	%	0.0%	0.0%	0.0%	0.0%
12	Effective Average billing rate	Rs/Unit	5.66	5.65	5.65	5.65
13	Surplus energy sold to other states	MU	19,271	27,583	28,131	24,736
Expense						
1	Employ cost escalation	%	8%	8%	8%	8%
2	Repair & Maintenance escalation	%	6%	6%	6%	6%
3	Administrative & General escalation	%	6%	6%	6%	6%
Financial position of Utility -		SCN-E				
Sl.no	Description	Units	2015-16	2016-17	2017-18	2018-19
1	Net sales-Power	Rs Cr	30,639	35,255	37,784	39,349
2	Meter rent,theft recov etc	Rs Cr	943	971	999	1,028
3	Other Income (Intt., DPS etc.)	Rs Cr	796	835	877	921
Total Income			32,378	37,061	39,660	41,298
Expenditure						
4	Transmission charges @ 0.19/unit	Rs Cr	995	1,076	1,163	1,263
5	Power Purchase	Rs Cr	20,159	25,718	27,996	28,826
6	Generation cost	Rs Cr	5,160	5,160	5,160	5,160
7	Employee cost	Rs Cr	4,541	4,904	5,296	5,720
8	R & M Cost	Rs Cr	441	468	496	526
9	Admn. & General expenses	Rs Cr	145	157	169	183
10	Others	Rs Cr	-	-	-	-
Total Expenses			31,441	37,483	40,281	41,678
11	Gross Profit	Rs Cr	936	(422)	(621)	(379)
12	Interest	Rs Cr	1,878	2,007	2,122	2,557
13	Depreciation	Rs Cr	975	1,144	1,329	1,469
14	Profit before tax	Rs Cr	(1,916)	(3,573)	(4,072)	(4,405)
15	Tax	Rs Cr	-	-	-	-
Net Profit after taxes			(1,916)	(3,573)	(4,072)	(4,405)

Table-10.8B

Description	2015-16	2016-17	2017-18	2018-19
Cash inflow				
-Grants	5	169	602	466
-Equity	671	673	872	1,032
-Long term loans-Govt.	2,338	2,359	1,629	1,941
-Profit before Tax	(1,916)	(3,573)	(4,072)	(4,405)
-Depreciation	975	1,144	1,329	1,469
-Interest	1,878	2,007	2,122	2,557
-Bank borrowings for working capital	557	613	674	742
-Security deposit from consumers	-	-	-	-
Deposit for Electrification, Service Connection etc.	-	-	-	-
Short term borrowings	-	-	1,063	3,419
Total Cash inflow	4,508	3,391	4,220	7,221
Cash outflow				
-capital expenditure	3,014	3,200	3,103	3,439
-Loan repayments	-	-	-	334
-Repayment of short term borrowings	-	-	-	1,063
-Interest payouts	1,878	2,007	2,122	2,419
-Increase in working capital	(204)	(425)	(239)	(173)
-Interest on short term borrowings	-	-	-	138
-Tax	-	-	-	-
Total cash outflow	4,688	4,782	4,987	7,221
Net cash inflow	(180)	(1,391)	(767)	-
Opening cash balance from previous year	2,338	2,158	767	-
Closing cash balance	2,158	767	-	-

Tariff hike to the tune of 5.0%, 4% and 4% on Average billing rate of Rs 5.65 per unit

respectively will be required from FY 2016-17 to FY 2018-19 for financial sustainability.

CHAPTER – 11 : OTHER INITIATIVES

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.

A centralized corporate communication team can be formed at headquarters of the DISCOM

for looking at activities of overall communication strategy.

The financial situation in Punjab makes it imperative to raise tariffs while other initiatives including 24X7 supplies 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 Punjab will also be required.

Table-11.1

Proposed Communication Responsibilities

Communication Objective	Responsibility	Frequency
“Power for all” - Roll Out Plan	Power Secretary	Quarterly
Power Supply Position	CMD PSTCL	Daily
Energy Savings & Conservation	CE(T) Audit	Monthly
Planned Outages & Disruption	CMD, PSPCL	Daily
Real time feeder-wise Information	CMD, PSPCL	Daily
Status update on Deliverables	Power Secretary	Quarterly
Renewable Power	Director, PEDDA	Quarterly
Generation- Projects, PLF & Fuel	CMD, PSPCL	Monthly
Transmission Projects – Physical Progress and Achievements	CMD, PSTCL	Monthly
Distribution – Progress ,Achievements, Losses, Consumer Initiatives etc.	CMD, PSPCL	Monthly

Information Technology 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.

IT Initiatives Adopted by PSPCL

1. Introduction of IT in distribution in 47 ADDRP Towns under RAPDRP- Part-A.

Planned

1. Introduction of IT in distribution in Non APDRP Area.
2. Introduction of ERP in HR & Finance.

Measures adopted for consumer satisfaction

- 53 customer care centers in all major towns of Punjab



- 104 Divisional Nodal Centers for round the clock registration, Monitoring & resolution of Consumer complaints.
- Centralized electricity call center for registration, Monitoring & resolution of Consumer complaints.
- 100 % 3rd party feedback of all registered complaints.
- On-line registration System for all categories of consumers for 100 KW load & above to provide transparent, hassle free and Time Bound clearances for industrial connections.
- On-line registration system also facilitates NOC/Approvals for Electrical Layouts for Shopping Malls, Industrial Estates and Residential Colonies etc.
- Multiple bill payment options

Smart Grid Project

This pilot project scheme being implemented in Mohali town. The total scheme outlay is Rs. 10.11 Crores.

The tenders for engaging implementation agency have already been invited and likely to be decided by 31st December 2014 and after that the scheme shall be implemented by July, 2016.

CRM INITIATIVES

Following Initiatives have been taken to provide efficient and time bound services to the consumers.

- Single phone number (1912) for supply related complaints throughout Punjab.
- E-payment of electricity bills.
- On-line registration of applications for electricity connections.

Table-11.2

Year wise Investment Plan

Sl. No.	Name of Scheme/Project	Annual Proposed Plan FY 2015-16	Annual Proposed Plan FY 2016-17	Annual Proposed Plan FY 2018-19
1	Construction of Power management Institute	10	10	15
2	ERP for HR & Finance	25	25	10
3	IT in Distribution for Non APDRP area	10	25	00

Institutional Arrangement

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 under-taken 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 Govt. - where necessary. The committee may be

constituted with the following members – PFC, REC, CEA, SECI, EESL, Ministry of Power Ministry of Coal, and MNRE.

- **State Government Level Committee:** It is proposed that a State level committee headed by the Chief Secretary 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. This committee will be constituted with the following Principal Secretaries/ Secretaries of the Power, Finance, Urban Development, Agriculture



and other relevant departments along with the CMD/Chairman/MD of state utilities.

- **Department Level Committee:** It is proposed that the Department level committee headed by the Power Secretary will be formed and 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. The committee will be constituted with the following members – Secretary (Power) and CMD of state utilities.
- **District Level Committee** – It is proposed to constitute a district level committee headed by the District Collector 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. The committee will be constituted with the following members – District Collector and Superintendent Engineer of state utilities.
- **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.

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. It is also imperative to state that for serving the consumers in a different way change of mindset of the employees would be required. It is critical that Change Management initiatives are rolled out and institutionalized throughout the DISCOM for achieving better results. The details of the present employee in the Punjab Discom are as under:



Table-11.3**Man Power of PSPCL**

Sl. No.	Description	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14
1	Manpower deployed (Nos.)	55547	53557	49082	46323
2	Per distribution Transformer	0.12	0.10	0.08	0.069
3	Per MVA of distribution Transformer	2.75	2.50	2.15	1.91
4	Per Ckt.KM of 11KV Line	0.31	0.28	0.24	0.221
5	Per Ckt.KM of LT Line	0.34	0.34	0.32	0.304
6	Per MW of installed capacity	7.90	7.74	6.37	5.23
7	Per MU of Generation	1.25	1.19	1.08	0.99
4	Per thousand connections	7.59	7.04	6.22	5.71
5	Per MW connected load	2.03	1.87	1.65	1.50
6	Per MU of energy sold	1.55	1.47	1.29	1.17
7	Per Rs. One lac Revenue	0.06	0.05	0.04	0.03

In view of the importance of the training on new technologies, there is a requirement for development and implementation of Human Resource training program so as to realize the dream of 24 X 7 power supply system in the state in its true sense.

PSEB (Now PSPCL) had already framed the training policy in 2007. Besides, value addition, we are ensuring that the employees are kept aware of the latest knowledge and skills and are enabled to undertake current and future responsibilities in more effective manner.

The training policy of PSEB (Now PSPCL) envisage to ensure in service training becomes a part of career plan in PSPCL, training shall be mandatory and the grant of promotional scale of all the officials shall be linked to completion of minimum of 5 days of training per year.

PSPCL imparting in-house training to its employees at TTI Patiala, TTCs located at Bathinda, Jalandhar, Amritsar and Lalton Kalan (Ludhiana). The training is also being imparted by training centers located at GNDTP, Bathinda, GHTP LehraMohabbat and GGSSTP Ropar.

To enhance the competency of employees regular refreshed training courses are being conducted for technical (ALM to AE) and

clerical/account staff (LDC to Accountant) at TTI Patiala and LM/ALM only at TTCs.

Under RAPDRP – Part-A, IT system is being implemented in Distribution Wing and training is being imparted to the employees regarding online Metering, Billing, Collection, and Store Keeping. AMMR, CC Centre, GIS, Technical Returns etc. These trainings to the existing employees will continue at different locations of PSPCL by IT Department.

The following C&D employee's category Training programs sponsored by GOI (MOP) are also being conducted at TTI and at TTCs located at Zonal Head Quarters for the last five years.

Variant 1 Lineman Training – LINEMEN VER II
 Variant 2 Metering & Billing – MBC (2 Days)
 Variant 3 Metering & Billing – MBC (3 Days)
 Variant 4 FIN ADMIN VER II

Variant5 Safety, Accidents and prevention – SAFETY.

Variant 6 Up gradation of IT skills-IT SKILLS.

Variant7 Operation & Maintenance of Distribution T/Fs DTRs.

Besides, following outsource trainings are also being arranged for officers by signing MOUs with various reputed training houses in India.



- Techno Managerial
- Management Development Programs
- Financial Management Programs
- Job specified trainings like for hydel, generation, civil enggs etc.

Induction training to newly recruited officers/officials is also being arranged at TTI as well as a reputed training house in India depending upon the recruitment every year. Regarding training of these new recruited employees, the following clause was added in the advertisement.

The selected candidates shall undergo training at TTI, Patiala as per PSPCL instruction. The final place of posting shall be allocated after successful completion of training. In accordance with this and as per PSPCL training policy, it is mandatory to provide one year of induction training to newly recruited officers and 6 months of induction training to newly recruited officials. The induction training comprises of

- In house training
- Outsourced training
- On the job training

ODMD/CELL PSPCL Patiala have also arranged following outsource training program for PSPCL officers/officials by signing MOUs with various reputed training houses of India.

- Competency mapping
- Organization belongingness
- Legal & office procedure workshop
- General health awareness program
- Quality circle concept & 5-S program
- OD intervention workshop
- Next level competency mapping & professional excellence program.

Training man days achieved during last 5 year is under:

FY 2010-11	64000	Training man days
FY 2011-12	93938	Training man days
FY 2012-13	101606	Training man days
FY 2013-14	98930	Training man days
FY 2014-15	119963	Training man days



CHAPTER – 12 : YEAR WISE ROLL OUT PLAN

YEAR WISE ROLL OUT PLAN						
Deliverables						
Power for All – Roll Out Plan	Units	FY2015-16	FY2016-17	FY2017-18	FY2018-19	Total
GENERATION						
State Sector		-	-	-	-	-
Central Generating Stations Share	MW	-	-	-	-	-
Bhakra Beas Management Board (BBMB) Share	MW	-	-	-	-	-
IPPs / PVT. Sector / JV / Partnership	MW	1860	-	-	-	1860
New Power Plants / New Cgs Share						
• New Thermal	MW	50	931	-	-	981
• New Hydro	MW	723	223	196.8	61	1203.8
Non Conventional (PEDA & NRSE)	MW	545	797.8	796	647.5	2786.3
TOTAL		3178	1951.8	992.8	708.5	6831.1
TRANSMISSION						
Inter State						
Sub-station	Nos./MVA	1 GSS/(2x500 MVA) = 1000 MVA				NA
Lines	Ckt km					NA
Intra State						
400kV substation	Nos./MVA	1/1000	-/2x500	-	-	
Lines	Ckt km	-	-	-	-	
220kV substations	Nos./MVA	5/1672.5	5/2160	3/1640	800	
Lines	Ckt km	719	730	330	250	
132kV substations	Nos./MVA	57.5	-	-	-	
Lines	Ckt km	-	-	-	-	
Transformation capacity	Nos./MVA	6/2730	5/3160	3/1640	800	
Ckt km		719	730	330	250	



DISTRIBUTION						
AT&C Losses	%	16.51	16.00	15.48	15.32	
No. of 33/66 KV Lines /feeders	Nos.	14	14	14	14	56
Total length of 33/66 KV lines	Ckt. Km.	600	600	600	600	2400
Total No. of 66/11KV &PSS	Nos.	37(25+12)	25	25	25	112
Total capacity of 66/11 KV PSS	MVA	2060	1826	1826	1826	7538
Total No. of Distribution transformers	Nos.	100230	115267	132555	151514	499566
Total Capacity of Distribution transformers	MVA	3462	3515	3561	3581	14119
No of 11 KV Lines	Nos.	930	935	940	945	3750
Total length of 11kV lines	Ckt. Km.	53727	54778.5	62995	47562	219062.5
Total length of LT Lines	Ckt. Km.	22874	26305	30251	34578	114008
RENEWABLE ENERGY						
Solar PV	MW	500	750	750	600	2600
Mini Hydro Projects	MW	15	9.8	6	2.5	33.3
Biomass	MW	20	20	20	30	90
Co-gen*	MW	10	18	20	15	63
Total	MW	545	797.8	796	647.5	2786.3
SOLAR OFF-GRID						
Grid connected Solar Rooftops	MW	10	240	250	300	800
Solar power plant	kW	1000	1500	2000	2500	7000
Solar pump systems	Nos.	2000	N.A.	N.A.	N.A.	2000
Solar Power Pack (300 W each)	Nos.	1000	1000	1500	2000	5500
Solar Street Lighting	Nos.	5000	5000	7000	10000	27000
Solar Lantern for BPL and SC&ST	Nos.	5000	5000	5000	5000	20000



CHAPTER - 13 : SECTOR WISE INVESTMENT PLAN & FUND REQUIREMENT

SECTOR WISE INVESTMENT PLAN AND FUND REQUIREMENT								
(Rs in Cr.)								
		Sector	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	Total (Rs Cr)	Remarks
Generation	ShahpurKandi Power Project (206 MW- Hydel) - Likely to be commissioned by July 2017 (UNDER CONSTRUCTION)	State	400	400	400	625	1825	
	Mukerian Power House Stage - II (18 MW - Hydel) - Likely to be commissioned by 31.12.15 (UNDER CONSTRUCTION)	State	60	20	--	--	80	
	Mukerian Thermal Power Plant - (Thermal - 2 x 660 MW (FUTURE PLAN)	State	-	-	-	-	0	REC has conveyed "In Principle Approval" for 80% debt funding of Rs. 6120 Crores subject to Techno Economic Appraisal and establishment of viability of project and balance 20% of the project cost shall be arranged by PSPCL.
Total Generation (1544 MW)			460	420	400	625	1905	
Transmission	Intra State		500	395	260	170	1325	
	Inter State		-	-	-	-	-	
TOTAL TRANSMISSION			500	395	260	170	1325	



SECTOR WISE INVESTMENT PLAN AND FUND REQUIREMENT								
(Rs in Cr.)								
		Sector	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	Total (Rs Cr)	Remarks
Sub-transmission & Distribution	Works relating to R-APDRP-Part-A (including SCADA)		50	104.39	0	0	154.39	
	Work relating to R-APDRP- Part-B		900	487.79	0	0	1387.79	
	Others (Renovation & Augmentation of distribution Network, Shifting of meters outside consumer premises, Providing 11 KV manual operative switched capacitors, Comprehensive T&D losses reduction plan, HVDS in Agriculture, Release of Tubewell connections etc.)		1877.97	1708.7	2157.465	1939.27	7683.405	
	RGGVY		5				5	
	Integrated Power development (IPDS)			150	102	100	352	
	DDUGJY			280	154	80	514	
	TOTAL DISTRUBUTION		2832.97	2730.88	2413.465	2119.27	10096.59	
	SUB-TRANSMISSION		480	550	566.50	614.08	2210.58	State Scheme
NRSE Projects	Solar PV		4000	6000	6000	4800	20800	
	Mini Hydro Projects		90	58.8	36	15	199.8	
	Biomass		110	110	110	165	495	
	Co-gen		55	99	110	82.5	346.5	
	Total		4255	6267.8	6256	5062.5	21841.3	
GRAND TOTAL			8724.17	10320.39	10057.16	9837.16	38938.88	



ANNEXURE-I

Category wise growth in Consumers

Category-wise Growth in consumers	Year-wise Actual figures from FY 2009-10 to FY 2014-15											
	FY 2009-10		FY 2010-11		FY 2011-12		FY 2012-13		FY 2013-14		FY 2014-15	
	No. of Consumers	Consumption (MU)	No. of Consumers	Consumption (MU)	No. of Consumers	Consumption (MU)	No. of Consumers	Consumption (MU)	No. of Consumers	Consumption (MU)	No. of Consumers	Consumption (MU)
Domestic	4871970	7007.49	5189557	7915.24	5420916	8635.93	5642850	9284.9	5820606	10344.15	6006790	11137.84
Commercial	823370	2032.50	866914	2380.63	895949	2612.52	923854	2712.37	938572	2969.3	967714	3175.97
Industrial (LT)	98102	1916.65	99704	2620.43	101095	2762.81	101973	2743.72	101611	2785.93	102551	2865.24
Industrial (HT)	7296	8690.90	7952	8051.83	8635	8365.64	9326	8970.68	9700	9134.94	9927	10534.92
Public Lighting	2297	127.49	2544	129.36	2788	136.14	3015	145.82	3491	158.79	3664	174.87
Traction	9	143.96	9	142.05	9	137.73	9	134.82	7	140.42	8	149.91
Agriculture	1105517	10469.30	1143267	10116.89	1163274	10248.63	1191407	10779.03	1225066	10223.57	1225340	10641.4
Public Water Works & Sewage Pumping	9092	340.02	10188	358.29	11477	368.95	12131	405.02	12716	427.18	13462	444.47
Miscellaneous	492	482.70	496	517.00	501	537.73	511	565.68	517	598.34	520	1278.38 (including export)
Total	6918145	31211.01	7320631	32231.72	7604644	33806.08	7885076	35742.04	8112286	36782.62	8329976	40403



ANNEXURE-II

Detailed Calculation of Energy Demand in the State of Punjab Up To FY 2018-19

Sl. No.	Particulars→ ↓	Units	Years			
			FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
A	DEMAND PROJECTIONS FOR ELECTRIFIED HOUSEHOLDS					
1	Consumption of Rural Electrified Households					
2	Consumption (units per day per household)		4.43	4.87	5.36	5.89
3	Annual Energy Requirement for existing electrified Rural Household	MUs	5,437	5,980	6,578	7,236
4	Consumption of Urban Electrified Households					
5	Consumption (units per day per household)	Units	6.93	7.49	8.09	8.73
6	Annual Energy Requirement for existing electrified Household (Urban)	MUs	6,691	7,226	7,804	8,429
7	Total Annual Energy Requirement for existing electrified households (Rural+Urban)	MUs	12,128	13,206	14,382	15,665
B	ADDITIONAL ENERGY REQUIREMENTS FOR ELECTRIFIED DOMESTIC CONSUMERS					
1	Additional Energy Required for Electrified Households (Annual projection (-) current Energy available MUs)	MUs	990	2,068	3,244	4,527
C	ELECTRIFICATION OF UNELECTRIFIED HOUSEHOLDS (per year)					
	<u>URBAN</u>					
1	Unelectrified Household as on 31.03.2015	Nos.	-			
2	Electrification of unelectrified Household	Nos.	-	-	-	-
3	Cumulative Annual Energy Requirement for Electrification of unelectrified Household (Urban)	MUs	-	-	-	-
	<u>RURAL</u>					
4	Unelectrified Households	Nos.	-			
5	Targeted Electrification of unelectrified Household	%	25%	25%	25%	25%



Sl. No.	Particulars→ ↓	Units	Years			
			FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
6	Electrification of unelectrified Household	Nos.	-	-	-	-
7	Cumulative Annual Energy Requirement for Electrification of unelectrified Household (Rural)	MUs	-	-	-	-
8	Total households electrified out of unelectrified (Rural + Urban)	Nos.	-	-	-	-
9	Annual Energy Requirement for Electrification of unelectrified Household (Rural+Urban)	MUs	-	-	-	-
D	ELECTRIFICATION OF NEWLY CONSTRUCTED HOUSEHOLDS (per year)					
	<u>URBAN</u>					
1	Total Household - Urban (nos.) 2014	Nos	2,643,691			
	Yearly Increase in Urban H/H	Nos	91,578	94,750	98,032	101,428
2	Yearly cumulative Increase in Urban H/H as per state	Nos.	91,578	186,328	284,361	385,789
3	Cumulative Annual Energy Requirement (MUs) for newly constructed Household - Urban	MUs	232	509	839	1,230
	<u>RURAL</u>					
4	Total Household Rural 2014	Nos	3,363,099			
	Yearly Increase in Rural H/H as per state	Nos.	60,341	61,424	62,526	63,648
5	Yearly cumulative Increase in Rural H/H as per state		60,341	121,765	184,291	247,939
6	Annual Energy Requirement for newly constructed Household (Rural)	MUs	98	217	360	533
7	Total newly constructed households (Rural+Urban)	Nos.	151,919	308,093	468,652	633,728
8	Cumulative Annual Energy Requirement for newly constructed Household (Rural+Urban)	MUs	330	726	1,199	1,763
E	ANNUAL ENERGY REQUIREMENTS					
1	Total Additional Annual Energy Requirement - Domestic Consumer	MUs	1,320	2,794	4,443	6,290
2	Current Energy Available - Total	MUs	40,403	40,403	40,403	40,403
3	Current Energy Available - Domestic	MUs	11,138	11,138	11,138	11,138
4	Total Domestic Annual Energy Requirement (Current + Projection)	MUs	12,458	13,932	15,581	17,428
5	Current Energy Available - Other than Domestic	MUs	29,265	29,265	29,265	29,265



Sl. No.	Particulars→ ↓	Units	Years			
			FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
6	Total Annual Energy Requirement - Other than Domestic Consumers (with 7.5% growth P.A.)	MUs	31,460	33,820	36,356	39,083
	Additional Energy Required for other than domestic Categories of Consumers (year wise)	MUs	2,195	2,360	2,536	2,727
7	Additional Energy Required for other than domestic (Cumulative)		2,195	4,554	7,091	9,818
8	Total Energy Requirements (all)	MUs	43,918	47,752	51,937	56,511



ANNEXURE-III

Break up & details of capacities existing and likely to be added year wise

Sl. No.	Power Sources / Generating Stations	Type (Thermal / Hydro / NRSE etc.)	Location of the Plant	As on March 2015 (MW)	Capacity Available as Planned				REMARKS
					FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
					(MW)	(MW)	(MW)	(MW)	
A	STATE SECTOR (OWN) GENERATING STATIONS								
A1	THERMAL								
A1.1	Guru Gobind Singh Super Thermal Plant (GGSSTP), Ropar (6 x 210 = 1260 MW)	Thermal	Punjab	1260	1260	1260	1260	1260	
A1.2	Guru Hargobind Thermal Plant (GHTP), Lehra Mohabbat (2 x 210 + 2 x 250 = 920 MW)	Thermal	Punjab	920	920	920	920	920	
A1.3	Guru Nanak Dev Thermal Plant (GNDT), Bhatinda (2 x 110 + 2 x 120 = 460 MW)	Thermal	Punjab	460	460	460	460	460	
A1.4	SUBTOTAL STATE THERMAL			2640	2640	2640	2640	2640	
A2	HYDEL POWER GENERATING STATIONS (INCLUDING MICRO HYDRO PROJECTS)								
A2.1	Shanan PHs (Stage I & II) (4 x 15 + 1 x 50 = 110 MW)	Hydel	Punjab	110	110	110	110	110	
A2.2	Upper Bari Doab Canal Hydroelectric Project (UBDC) (3 x 15 + 3 x 15.45 = 91.35 MW)	Hydel (NRSE project)	Punjab	91.35	91.35	91.35	91.35	91.35	
A2.3	Mukerian (MHP) (6 x 15 + 6 x 19.5 = 207 MW)	Hydel	Punjab	207	207	207	207	207	
A2.4	Anandpur Sahib (ASHP) (4 x 33.5 = 134 MW)	Hydel	Punjab	134	134	134	134	134	
A2.5	RSD (4 x 150 = 600 MW)	Hydel	Punjab	452.4	452.4	452.4	452.4	452.4	Balance 147.6 MW is share for J&K
A2.7	Nadampur Micro (2x0.4 MW)	Hydel (NRSE)	Punjab	0.8	0.8	0.8	0.8	0.8	



Sl. No.	Power Sources / Generating Stations	Type (Thermal / Hydro / NRSE etc.)	Location of the Plant	As on March 2015	Capacity Available as Planned				REMARKS
					FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
				(MW)	(MW)	(MW)	(MW)	(MW)	
		project)							
A2.8	Daudhar Micro (3 x 0.5 MW)	Hydel (NRSE project)	Punjab	1.5	1.5	1.5	1.5	1.5	
A2.9	Rohti Micro (2 x 0.4 MW)	Hydel (NRSE project)	Punjab	0.8	0.8	0.8	0.8	0.8	
A2.10	Thuhi Micro (2 x 0.4 MW)	Hydel (NRSE project)	Punjab	0.8	0.8	0.8	0.8	0.8	
A2.11	GGSTPP Micro, Ropar (1.7 MW)	Hydel (NRSE project)	Punjab	1.7	1.7	1.7	1.7	1.7	
A2.12	SUBTOTAL STATE HYDEL			1000.35	1000.35	1000.35	1000.35	1000.35	
A3	PUNJAB ENERGY DEVELOPMENT AUTHORITY (PEDA) AND NEW & RENEWABLE SOURCES OF ENERGY (NRSE)								
A3.1	Biomass IPP	NRSE	Punjab	62.5	82.5	102.5	122.5	152.5	
A3.2	Mini Hydel	NRSE	Punjab	35.05	50.05	59.85	65.85	68.35	
A3.3	Solar	NRSE	Punjab	224.27	724.27	1474.27	2224.27	2824.27	
A3.4	Cogeneration (Bagasse/ biomass)	NRSE	Punjab	162.18	172.18	190.18	210.18	225.18	
A3.5	PSPCL own Hydel NRSE Project	NRSE	Punjab	0	0	0	0	0	Included in state (Hydro NRSE Project)
A3.6	SUBTOTAL STATE PEDA & NRSE			484.00	1029.00	1826.80	2622.80	3270.30	
A4	TOTAL STATE SECTOR (A1.4+A2.12+A3.6)			4124.35	4669.35	5467.15	6263.15	6910.65	
B	CENTRAL SECTOR POWER GENERATING STATIONS (CGS)								
B1	CGS THERMAL								
B1a	NTPC THERMAL PLANTS								
B1a.1	Farakka STPS (1600MW)	Thermal	WB	22.24	22.24	22.24	22.24	22.24	



Sl. No.	Power Sources / Generating Stations	Type (Thermal / Hydro / NRSE etc.)	Location of the Plant	As on March 2015	Capacity Available as Planned				REMARKS
					FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
				(MW)	(MW)	(MW)	(MW)	(MW)	
B1a.2	Singrauli STPS-I, Singrauli, Rihand, Dadri and Feroze Gandhi (5 X 200MW+ 2X500MW)	Thermal	MP	200	200	200	200	200	
B1a.3	Rihand-I (2 X 500MW)	Thermal	UP	110	110	110	110	110	
B1a.4	Unchahar-I, II & III (2 X210 + 2 X 210 + 210 = 1050MW)	Thermal	UP	112.98	112.98	112.98	112.98	112.98	
B1a.5	Anta Gas (419MW)	Thermal	Rajasthan	48.98	48.98	48.98	48.98	48.98	
B1a.6	Auraiya Gas (663 MW)	Thermal	UP	83.01	83.01	83.01	83.01	83.01	
B1a.7	Dadri Gas (830MW)	Thermal	UP	131.97	131.97	131.97	131.97	131.97	
B1a.8	Rihand -II (2X500MW)	Thermal	UP	102	102	102	102	102	
B1a.9	Rihand -III (2X500MW)	Thermal	UP	82.67	82.67	82.67	82.67	82.67	
B1a.10	Kahalgaon-Stagel(4X210MW)	Thermal	Bihar	50.99	50.99	50.99	50.99	50.99	
B1a.11	Kahalgaon-StagelII (2X500 +500 = 1500MW)	Thermal	Bihar	120.3	120.3	120.3	120.3	120.3	
B1a.12	SUB TOTAL - CGS NTPC THERMAL			1065.14	1065.14	1065.14	1065.14	1065.14	
B2	CGS HYDRO								
B2a	NHPC HYDRO								
B2a.1	Baira suil (3 X60MW)	Hydel	HP	83.7	83.7	83.7	83.7	83.7	
B2a.2	Salal-I (6 X115MW)	Hydel	J&K	183.54	183.54	183.54	183.54	183.54	
B2a.3	Tanakpur (94MW)	Hydel	Uttarakhand	16.85	16.85	16.85	16.85	16.85	
B2a.4	Chamera I (3X180MW)	Hydel	HP	55.08	55.08	55.08	55.08	55.08	
B2a.5	Uri-I (4 X 120MW)	Hydel	J & K	66	66	66	66	66	
B2a.6	Chamera II (300MW)	Hydel	HP	30	30	30	30	30	
B2a.7	Dhauliganga-I (280MW)	Hydel	Uttarakhand	28	28	28	28	28	
B2a.8	Dulhasti (3X130MW)	Hydel	J & K	32.29	32.29	32.29	32.29	32.29	
B2a.9	Sewa-II (3 X40MW)	Hydel	J & K	10	10	10	10	10	
B2a.10	Chamera III (231MW)	Hydel	HP	18.15	18.15	18.15	18.15	18.15	
B2a.11	Uri-II Stage-II(4 X 60MW)	Hydel	J & K	19.52	19.52	19.52	19.52	19.52	
B2a.12	SUB TOTAL - CGS NHPC			543.13	543.13	543.13	543.13	543.13	



Sl. No.	Power Sources / Generating Stations	Type (Thermal / Hydro / NRSE etc.)	Location of the Plant	As on March 2015	Capacity Available as Planned				REMARKS
					FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
				(MW)	(MW)	(MW)	(MW)	(MW)	
	HYDRO								
B2b	TEHRI HYDRO								
B2b.1	Tehri HEP Stage-I (4x250 MW)	Hydel	Uttrakhand	77	77	77	77	77	
B2b.2	Koteshwar HEP (4x 100MW)	Hydel	Uttrakhand	25.44	25.44	25.44	25.44	25.44	
B2b.3	Parbati-III dist Kullu (4x130 MW)	Hydel	HP	40.87	40.87	40.87	40.87	40.87	
B2b.4	SUB TOTAL - CGS TEHRI HYDRO			143.31	143.31	143.31	143.31	143.31	
B2c	SJVNL HYDRO								
B2c.1	SJVNL (Formerly NJPC)- 6 X 250MW	Hydel	HP	151.95	151.95	151.95	151.95	151.95	
B2c.2	Rampur HEP- (6x68.67 = 412.02 MW)	Hydel	HP	23.16	23.16	23.16	23.16	23.16	
B2c.3	SUB TOTAL- CGS SJVNL HYDRO			175.11	175.11	175.11	175.11	175.11	
B2d	TALA HYDRO								
B2d.1	Tala HEP (1020MW) (Jt. Venture between Gol and Govt. of Bhutan)	Hydel	Bhutan	29.99	29.99	29.99	29.99	29.99	
B2d.2	SUB TOTAL - CGS TALA HYDRO			29.99	29.99	29.99	29.99	29.99	
B3	SUB TOTAL - CGS HYDRO (B2a.12 + B2b.4 + B2c.3 + B2d.2)			891.54	891.54	891.54	891.54	891.54	
B4	CGS NUCLEAR								
B4a	NPCIL NUCLEAR PLANT								
B4a.1	NAPP - Narora (2 X 220MW)	Nuclear	UP	51	51	51	51	51	
B4a.2	RAPP-3 &4 (2 x 220MW)	Nuclear	Rajasthan	100.00	100.00	100.00	100.00	100.00	
B4a.3	RAPP 5 & 6 (2 X 220MW)	Nuclear	Rajasthan	45.8	45.8	45.8	45.8	45.8	
B4a.4	SUB TOTAL - CGS NUCLEAR			196.80	196.80	196.80	196.80	196.80	



Sl. No.	Power Sources / Generating Stations	Type (Thermal / Hydro / NRSE etc.)	Location of the Plant	As on March 2015	Capacity Available as Planned				REMARKS
					FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
				(MW)	(MW)	(MW)	(MW)	(MW)	
B5	MISCELLANEOUS THROUGH CGS								
B5.1	Durgapur Steel TPS (2X500MW)	Thermal	West Bengal	200	200	200	200	200	
B5.2	Mallana -II (100MW)	Hydel	HP	86	86	86	86	86	
B5.3	Mundra UMPP (CGPL) - (5 X 800MW)	Thermal	Gujarat	475	475	475	475	475	
B5.4	Sasan UMPP (6 x 660MW)	Thermal	MP	558	558	558	558	558	
B5.5	Pragati Gas based Power Project (1371MW)	Thermal	Delhi	137.1	137.1	137.1	137.1	137.1	
B6	SUB TOTAL MISCELLANEOUS THROUGH CGS -			1456.1	1456.1	1456.1	1456.1	1456.1	
B7	TOTAL CGS SHARE (B1a.12 + B3 + B4a.4 +B6)			3609.58	3609.58	3609.58	3609.58	3609.58	
C	IPP & PRIVATE SECTOR PROJECTS								
C1	Nabha Power Ltd, Rajpur, Punjab - by L&T (2 x 700 MW)	Thermal	Punjab	1400	1400	1400	1400	1400	Running
C2	Talwandi Sabo Power Ltd. (TSPL - GoP SPV with) (3 x 660 MW)	Thermal	Punjab	660	1980	1980	1980	1980	U1# RunningU2# COD November 2015, U3# COD January 2016
C3	GVK Goindwal (2 x 270MW)	Thermal	Punjab	0	540	540	540	540	COD 31.12.15 IPP with Cost Plus basis tariff; ready for coal firing. Coal block De allocated
C4	TOTAL IPP & PRIVATE SECTOR PROJECTS (SUM : C1 to C3)			2060	3920	3920	3920	3920	
D	UNALLOCATED POWER								
D1	Dadri II (2 X 490MW)	Thermal	UP	0	0	0	0	0	
D2	APCPL Jhajjar (NTPC JV)- 3 X	Thermal	Harayana	0	0	0	0	0	



Sl. No.	Power Sources / Generating Stations	Type (Thermal / Hydro / NRSE etc.)	Location of the Plant	As on March 2015	Capacity Available as Planned				REMARKS
					FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
				(MW)	(MW)	(MW)	(MW)	(MW)	
	500MW								
D3	TOTAL UNALLOCATED POWER			0	0	0	0	0	
E	BHAKHRA BEAS MANAGEMENT BOARD (BBMB)								
E1	Share of Punjab from BBMB	Hydel	Punjab	1161.28	1161.28	1161.28	1161.28	1161.28	
E2	TOTAL BBMB SHARE			1161.28	1161.28	1161.28	1161.28	1161.28	
F	NEW POWER PLANTS (YET TO BE COMMISSIONED) DEALT BY ISB (Misc)								
F1	NEW THERMAL								
F1A	NTPC								
F1A.1	Anta-II, Rajashtan (419 MW)	Gas	Rajasthan	0	0	65	65	65	Likely Commissioning 2016-17
F1A.2	Auriya-II UP (652 MW)	Gas	UP	0	0	65	65	65	Likely Commissioning 2016-17
F1A.3	NorthKaranpura STP,Hazari Bag (3 X 660MW)	Thermal	Jharkhand	0	0	70	70	70	Likely Commissioning 2016-17
F1A.4	Barh-Stage-I (3 X 660MW)	Thermal	Bihar	0	0	0	0	0	No power is allocated to PSPCL
F1A.5	Barh-Stage-II (2 X 660MW)	Thermal	Bihar	0	0	0	0	0	No power is allocated to PSPCL
F1A.6	Meja TPS (2 X 660MW)	Thermal	UP	0	0	33	33	33	Likely Commissioning 2016-17 (12th Plan)
F1A.7	Tanda Stage-II (2 X 660MW)	Thermal	UP	0	0	132	132	132	Likely Commissioning 2016-17
F1A.8	Singruli Stage -III (1x 500 MW)	Thermal	MP	0	50	50	50	50	Likely Commissioning 2015-16
F1A.9	Bilhaur TPS (660MW)	Thermal	Gujarat	0	0	66	66	66	Likely Commissioning 2016-17
F1B	DVC								



Sl. No.	Power Sources / Generating Stations	Type (Thermal / Hydro / NRSE etc.)	Location of the Plant	As on March 2015	Capacity Available as Planned				REMARKS
					FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
				(MW)	(MW)	(MW)	(MW)	(MW)	
F1B.1	Ragunathpura (2X500MW + 20%)	Thermal	WB	0	0	300	300	300	Likely Commissioning 2016-17
F1B.2	Bokaro TPS-A ((1X500MW)	Thermal	Jharkhand	0	0	200	200	200	Likely Commissioning 2016-17
F1C	IPP								
F1C.1	Dheeru Power Gen Ltd, Korba (2X300MW)	Thermal	Chattisgarh	0	0	0	0	0	The project has been commissioned. Punjab's allocated share is 300 MW. However, no power is being scheduled to PSPCL.
F1C.2	Udupi Power Corp Ltd, Bangalore (2 x 507.5MW)	Thermal	Karnataka	0	0	0	0	0	The project has been commissioned. Punjab's allocated share is 102 MW. However, no power is being scheduled due to pendency of tripartite agreement
F1C.3	Tillaiya, Hazaribagh (6 x 660 MW)	Thermal	Jharkhand	0	0	0	0	0	The matter regarding increase in Land and R&R cost and Article 13.3 of change in law is pending before CERC.
F1C.4	SUB TOTAL - NEW THERMALS			0	50	981	981	981	
F2	NEW HYDEL								
F2A	NTPC								
F2A.1	Tapovan Vishnu Gad (520MW)	Hydel	Uttarakhand	0	0	52	52	52	Likely Commissioning 2016-17
F2A.2	Rupsiabagar (261MW)	Hydel	Uttarakhand	0	0	26	26	26	Likely Commissioning 2016-17 (12th Plan)
F2A.3	Lata Tapowan (171 MW)	Hydel	Uttarakhand	0	0	0	0	17	Likely Commissioning 2018-19
F2A.4	Koldam HEP Bilaspur (4X 200 MW)		Himachal Pradesh	0	111	111	111	111	Likely Commissioning 2015-16



Sl. No.	Power Sources / Generating Stations	Type (Thermal / Hydro / NRSE etc.)	Location of the Plant	As on March 2015	Capacity Available as Planned				REMARKS
					FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
					(MW)	(MW)	(MW)	(MW)	
F2B	NHPC								
F2B.1	Parbati-II Dist Kullu (4X 200 MW)	Hydel	Himachal Pradesh	0	0	80	80	80	Likely Commissioning 2016-17
F2B.3	Pakaldul HEP Doda (1000MW)	Hydel	J&K	0	138	138	138	138	Likely Commissioning 2015-16
F2B.4	Bursar (1020MW)	Hydel	J&K	0	30	30	30	30	Likely Commissioning 2015-16
F2B.5	Kishanganga, Dist Baramulla (3X110MW)	Hydel	J&K	0	0	33	33	33	Likely Commissioning 2016-17
F2B.6	Kotlibhel Stage-IA Dist Tehri Garhwal (3 x 65MW)	Hydel	Uttrakhand	0	16	16	16	16	Likely Commissioning 2015-16
F2B.7	Kotlibhel Stage-IB Dist Tehri Garhwal (4 x 80MW)	Hydel	Uttrakhand	0	26	26	26	26	Likely Commissioning 2015-16
F2B.8	Kotlibhel Stage-II Dist Tehri Garhwal (8 x 66.5MW)	Hydel	Uttrakhand	0	44	44	44	44	Likely Commissioning 2015-16
F2B.9	Subhansiri Lower-I (1000MW)	Hydel	Arunachal Pradesh	0	0	32	32	32	Likely Commissioning 2016-18 1000 MW in 12th Plan 1000 MW in 13th Plan
F2B.10	Subhansiri Lower-II (1000MW)	Hydel	Arunachal Pradesh	0	0	0	32	32	
F2C	TEHRI								
F2C.1	Vishnugad pipalkoti HEP Dist Chamoli (4 X 111MW)	Hydel	Uttrakhand	0	0	0	0	44	Likely Commissioning 2018-19
F2D	IPP & PRIVATE SECTOR PROJECTS								
F2D.1	Karcham-Wangtoo Kinnour (4 x 250MW)	Hydel	Himachal Pradesh	0	0	0	0	0	The project has been commissioned. Punjab's allocated share is 200 MW. However, no power is being scheduled to PSPCL. PSPCL has filed petition before PSERC for obtaining approval to the procurement of power from the project.

Sl. No.	Power Sources / Generating Stations	Type (Thermal / Hydro / NRSE etc.)	Location of the Plant	As on March 2015 (MW)	Capacity Available as Planned				REMARKS
					FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
					(MW)	(MW)	(MW)	(MW)	
F2D.2	Teesta - III HEP North Dist Sikkim - By Teesta Urja Ltd, - An SPV by GoSikkim (6 x 200MW)	Hydel	Sikkim	0	340	340	340	340	Likely Commissioning 2015-16
F2D.3	Swasti Power Ltd Bhilangana (3 x 7.5MW)	Hydel	Uttanchal	0	0	0	0	0	The project has been commissioned. Punjab's allocated share is 22.5 MW. However, no power is being scheduled to PSPCL due to legal proceeding before CERC.
F2D.4	SUB TOTAL - NEW HYDEL			0	705	928	960	1021	
F3	TOTAL NEW POWER PLANTS (THERMAL & HYDEL) (F1C.4 + F2D.4)			0	755	1909	1941	2002	
G	PSPCL's HYDRO POWER								
G1	Shahpur Kandi (206 MW)	Hydel	Punjab	0	0	0	164.8	164.8	COD 31.12.17
G2	Mukerian Hydel Project Stage II, Punjab	Hydel	Punjab	0	18	18	18	18	COD 31.12.15
G3	SUB TOTAL OF PSPCL's HYDRO POWER (COMING IN NEAR FUTURE)			0	18	18	182.8	182.8	
	GRAND TOTAL (A4+B7+C4+D3+E2+F3+G3)			10955.21	14133.21	16085.01	17077.81	17786.31	

List of 400 kV and above Substations of PSTCL & PGCIL

Sl. No.	Name of Substation	Capacity 400/220 kV (MVA)	Aug. Approved(MVA)
A	PGCIL		
	Existing		
1	400kV Phagan Majra (Patiala)	$2 \times 315 + 1 \times 500 = 1130$	
2	400kV Malerkotla	$2 \times 315 + 1 \times 500 = 1130$	
3	400kV Ludhiana	$3 \times 315 + 1 \times 500 = 1445$	
4	400kV Moga	$1 \times 250 + 1 \times 315 + 2 \times 500 = 1565$	1x500MVA TO repl 1x250MVA
5	400kV Balachak (Amritsar)	$2 \times 315 + 1 \times 500 = 1130$	
6	400 kV Jalandhar	$2 \times 315 = 630$	1x500MVA
	New		
1	400 kV Patran	---	2x500
	Total	7030	1750
B	PSTCL		
	Existing		
1	400 kV Dhuri	$2 \times 500 = 1000$	1x500
2	400 kV Mukatsar	$2 \times 315 = 630$	1x500
3	400 kV Makhu	$2 \times 315 = 630$	
4	400 kV Nakodar	$2 \times 315 = 630$	
	New		
1	400 kV Rajpura		2x500
	Total	2890	2000

LIST OF 220kV SUBSTATIONS

Sl. No.	Name of Substation	220/132	220/66	132/66	132/33	132/11	Total Capacity
PSTCL Sub-stations							
1	Ablowal		2x100				200
2	Ajitwal		1x100				100
3	Algon		1x100				100
4	Amloh		2x100				200
5	Amloh Rd. G/garh (Gobindgarh 3)		2x100				200
6	Badshahpur		1x100				100
7	Bagha Purana		1x100	1x20/25		1x16/20+1x20	165
8	Bahadurgarh		2x100				200
9	Bajakhana		2x100				200
10	Bangan		1x160				160
11	Banur		2x100				200
12	Barnala		3x100				300
13	Batala (Wadala Granthian)	2x100	2x100			1x10/12.5+1x10	422.5
14	Bassi Pathana	1x100					100
15	Butari	1x100	2x100				300
16	Chhajli		1x100				100
17	Chohla Sahib		2x100				200
18	Chogawan		1x100				100



Sl. No.	Name of Substation	220/132	220/66	132/66	132/33	132/11	Total Capacity
19	Civil Lines ASR	1x100	2x100				300
20	Dasuya		1x100				100
21	Dera Bassi (Saidpura)		2x100				200
22	Devigarh		1x100				100
23	Dhanaula		1x160				160
24	Dhandari Kalan-I		2x100				200
25	Dhandari Kalan-II		2x100				200
26	Dharamkot		1x160	50+40/50		2x20	300
27	Dhuri		3x100				300
28	Doraha		1x100+1x160				260
29	Fatehgarh Churian		2x100				200
30	Ferozepur	2x100		1x40/50+1x50		2x16/20	340
31	Fzr. Rd. Ludhiana		1x100+1x160				260
32	F.P.Nabha		1x100+1x160				260
33	Ghubaya		2x100+30/50				250
34	Ghulal		2x100			20+10/12.5	232.5
35	Gobindgarh-I		3x100				300
36	Gobindgarh-II		3x100				300
37	Gobindgarh-IV		1x100				100
38	Goraya	2x100	1x100	1x40/50		2x20	390
39	Gaunsgarh		1x100+1x160				260
40	Himatpura		2x100				200
41	Humbran		3x100				300
42	Ikolaha		1x100				100



Sl. No.	Name of Substation	220/132	220/66	132/66	132/33	132/11	Total Capacity
43	Jagraon		1x100+1x160				260
44	Jamsher (Jalandhar-II)		2x100				200
45	Jhunir		1x100+1x160				260
46	Kakrala		2x100				200
47	Kanjli		1x100				100
48	Kartarpur	1x100	2x100				300
49	Kharar		2x100			16/20+20	200
50	Khassa		2x100				200
51	Kohara		2x100				200
52	Kotla Jangan		2x100				200
53	Kotli Suratmali		2x100				200
54	Lalru		2x100				200
55	Lalton Kalan		2x100+1x160				360
56	Mahal Kalan		2x100				200
57	Mahilpur	2x100		50	1x12.5/16	20	286
58	Majitha		1x100				100
59	Malerkotla		2x100 +1x160				360
60	Malout		2x100				200
61	Mansa		3x100				300
62	Mastewal		1x100				100
63	Moga	3x100				2x20	340
64	Mohali-I		3x100				300
65	Mohali-II Sector-80		2x100				200



Sl. No.	Name of Substation	220/132	220/66	132/66	132/33	132/11	Total Capacity
66	Mukatsar	3x100				1x10/12.5	312.5
67	Nurmahal		1x100			1x20+1x12.5	132.5
68	Pakhowal		1x100+1x160				260
69	Patran		3x100				300
70	Patti	1x100	2x100				300
71	Passiana		1x100				100
72	Rajla		2x100				200
73	Rajpura		2x100				200
74	Rashiana		2x100				200
75	Rehana Jattan		2x100				200
76	Sadiq		2x100			1x20	220
77	Sahnewal		3x100				300
78	Sandhaur		1x100				100
79	Sandhwan		1x100				100
80	Sarna	1x100	1x100				200
81	Sultanpur	2x100	1x160			1x16/20+10/12.5	392.5
82	Sunam	2x100 +1x160					360
83	Talwandi bhai	1x100	1x100	1x24/40+1x20/25		10/12.5+16/20	297.5
84	Talwandi Sabo		1x100				100
85	Thatha Sahib (Bottianwali)		2x100				200
86	Tibber		1x100				100
87	Udhoke		1x100				100
88	Verpal	3x100	1x30/50+1x100				450



Sl. No.	Name of Substation	220/132	220/66	132/66	132/33	132/11	Total Capacity
BBMB Sub-stations							
1	Barnala	(Switching Station)					
2	Ganguwal (BBMB)	2x90			2x12.5/16+16		221
3	Jalandhar(BBMB)	2x100+2x90	2x100				580
4	Jamalpur(BBMB)	3x100	3x100				600
5	Sangrur(BBMB)		3x45/60+100				280
PSPCL Sub-stations							
1	Bathinda(GNDTP)	2x100	1x100	2x40/50		1x20	420
2	Lehra Mohabbat (GHTP)		1x100+1x160				260
3	Ropar(GGSSTP)	2x100					200

List of 220/132 kV Transmission Lines of PSTCL

Sl. No.	Name of Line	No.of Ckts	Route Length (Km)	Conductor Size
Patiala Circle				
A	220 kV Lines			
1	220 kV Ablowal - 220 kV Gobindgarh-1	2	33.2	0.4
2	220 kV Ablowal - 400 kV Fagganmajra	2	10.33	0.4
3	220 kV Ablowal - 220 kV Rajla	1	29.3	0.4
4	220 kV Ablowal - 220 kV Passiana	1	7.56	0.4
5	220 kV Amloh - 220 kV Malerkotla	1	43	0.4
6	220 kV Bahadurgarh - 400 kV Fagganmajra	1	12.34	0.4
7	220 kV Bahadurgarh - 220 kV Rajpura	1	10.8	0.4
8	220 kV Bahadurgarh - 220 kV Devigarh	2	28	0.4
9	220kV Banga - 220 kV Patran	1	16.34	0.4
10	220kV Banga - 220kV Sunam	1	43.628	0.4
11	220kV Banur - 220kV Mohali-I	1	31.86	0.4
12	220kV Banur - 220kV Rajpura	1	32.86	0.4
13	220 kV Barnala BBMB - 220 kV GHTP, Lehra Mohabbat	1	37.92	0.4
14	220 kV Barnala PSTCL - 220 kV GHTP, Lehra Mohabbat	1	37.92	0.4
15	400kV Bhalwan - 220 kV Chajali	2	30.52	0.4
16	400 kV Bhalwan - 220 kV Dhuri	2	24.252	0.4
17	400 kV Bhalwan - 220 kV Dhanaula	2	40	0.4
18	220kV Banga - 220 kV Chajali	2	46.69	0.4
19	220 kV Derabassi - 220 kV Mohali-II	1	21	0.4
20	220 kV Derabassi - 220 kV Lalru	1	22.185	0.4
21	220 kV Dhanaula - 220 kV GHTP, Lehra Mohabbat	1	53	0.4
22	220 kV Dhuri - 220 kV Malerkotla	2	23.8	0.4
23	220 kV Ganguwal - 220 kV Mohali-I	2	73.421	0.4
24	220 kV Gobindgarh-1 - 220 kV Ikolaha	1	35	0.4
25	220 kV Gobindgarh-1 - 220 kV Amloh	1	8	0.4
26	220 kV Jhunir - 220 kV Sunam	1	43	0.4
27	220 kV Kakrala - 220 kV Patran	1	15.714	0.4
28	220 kV Kakrala - 220 kV Rajla	1	33.6	0.4
29	220 kV Kharar - 220 kV Mohali-I	1	11.23	0.4
30	220kV Lalru - 220 kV Mohali-I	1	41.185	0.4
31	400 kV PGCIL, Malerkotla - 220 kV Malerkotla	2	0.5	0.5x2
32	400 kV PGCIL, Malerkotla - 220 kV Malerkotla	1	0.5	0.4
33	220 kV Malerkotla - 220 kV Sandhaur	1	16.41	0.4
34	220 kV Mansa - 220kV Sunam	1	40.8	0.4
35	220 kV Mehalkalan - 220 kV Pakhowal	1	28.043	0.4
36	220kV Mohali-I - 220 kV Mohali-II	1	8.992	0.4
37	220 kV Mohali-I - 220 kV Rajpura	1	35.6	0.4
38	220 kV Nabha - 400 kV Fagganmajra	2	32.894	0.4
39	220 kV Nabha - 400kV Bhalwan	1	20	0.4

Sl. No.	Name of Line	No.of Ckts	Route Length (Km)	Conductor Size
40	220 kV Pakhowal - 220 kV Sandhaur	1	40.824	0.4
41	220kV Passiana - 220kV Rajla	1	25.24	0.4
42	220 kV Patran - 220 kV Rajla	1	33	0.4
43	220kV Patran - 220kV Sunam	1	35.655	0.4
44	220 kV Rajpura - 400 kV Fagganmajra	1	22.52	0.4
45	220 kV Rajpura - 220 kV Railway-1	2	3.5	0.4
46	220kV GGSSTP, Ropar - 220 kV Mohali-1	1	48.9	0.4
47	220kV Sunam - 400 kV Bhalwan	2	26	0.4
48	220kV GGSSTP, Ropar - 220kV Kharar	1	44.13	0.4
49	220 kV Derabassi - 220kV Railway	1	4.92	0.4
B	132 kV Lines			
1	132 kV Chamkaur Sahib - 132 kV Ropar	1	16	0.15
2	132 kV Anandpur Sahib - 132 kV Nakkian	1	3.478	0.2
3	132 kV Anandpur Sahib - 132 kV Railway	1	4.6	0.2
4	132 kV Kotla - 132 kV Ropar	3	38	0.2
5	132 kV Ropar- 220 kV GGSSTP, Ropar	1	19.76	0.2
6	132 kV Asron - 132 kV Ropar	1	6.053	0.2
7	132 kV Nakkian - 132 kV Ropar	1	34	0.2
8	220 kV Ghulal - 132 kV Ropar	1	34	0.15
9	220 kV Kharar - 132 kV Ropar	1	23.2	0.2
10	132 kV Ropar - Railway	1	15.075	0.2
11	220 kV GGSSTP, Ropar - 132 kV Asron	1	15.707	0.2
12	132 kV Asron - 132 kV Max-India	1	5.62	0.2
13	132 kV Asron - 132 kV Ranbaxy+DSM	1	7.262	0.2
14	132 kV Asron - 132 kV DCM	1	0.06	0.2
Bathinda Circle				
A	220 kV Lines			
1	220 kV Moga - 400 kV Moga PGCIL	2	0.496	0.4x2
2	220 kV Moga - 400 kV Moga PGCIL	2	0.272	0.5x2
3	220 kV Jagraon - 400 kV Moga PGCIL	1	34	0.4
4	220 kV Ajitwal - 400 kV Moga PGCIL	1	21.7	0.4
5	220 kV Jagraon- Ajitwal	1	14.3	0.4
6	220 kV Moga-Baghapurana	2	10	0.4
7	220 kV Moga-Talwandi Bhai	2	24.4	0.4
8	220 kV Talwandi Bhai-Firozpur	1	31.1	0.4
9	220 kV Talwandi Bhai-Botianwala	1	26.6	0.4
10	220 kV Firozpur- Botianwala	1	47.5	0.4
11	220 kV Moga-Sadiq	1	67	0.4
12	220 kV Mukatsar-Sadiq	1	40.5	0.4
13	220 kV Moga-Bajakhana	1	51.872	0.4
14	220 kV Mukatsar-Sandhwan	1	31	0.4
15	220 kV Bajakhana-Sandhwan	1	39.408	0.4
16	220 kV Botianwala-Mastewal	2	12	0.4

Sl. No.	Name of Line	No.of Ckts	Route Length (Km)	Conductor Size
17	220 kV GNDTP, Bathinda-Mukatsar	1	50	0.4
18	220 kV GNDTP, Bathinda-katorewala	1	46.5	0.4
19	220 kV Mukatsar-Katorewala	1	52.5	0.4
20	220 kV Muktsar-Ghubaya	1	40.304	0.4
21	220 kV GHTP, Lehra Mohabbat - Bajakhana	2	28.645	0.4
22	220 kV GHTP, Lehra Mohabbat -Talwandi Sabo	1	58.7	0.4
23	220 kV Mansa-Talwandi Sabo	1	29	0.4
24	220 kV Mansa-Dhanaula	1	38.76	0.4
25	220 kV GHTP, Lehra Mohabbat - Himatpura	2	40.585	0.4
26	220 kV Mansa-GGS Oil Refinery	2	48.5	0.4
27	220 kV Mansa-Jhunir	1	40.736	0.4
28	220 kV GNDTP, Bathinda - 220 kV GHTP, Lehra Mohabbat	2	25	0.4
29	220 kV Barnala PSTCL - 220 kV Sandhaur	1	40	0.4
30	400 kV Mukatsar - 220 kV Ghubaya	2	40.3	0.4
B	132 kV Lines			
1	132 kV Line from 220kV Moga - 220kV Baghapurana	1	12.5	0.2
2	220 kV Moga - 132 kV Badhni kalan	1	20	0.125
3	220 kV Moga - 132 kV Panjgrian	1	31.5	0.125
4	132 kV Sarainaga- Panjgrian	1	28.5	0.125
5	220 kV Moga - 132 kV Sosan	1	19.532	0.15
6	132 kV Sosan - 220 kV Talwandi Bhai	1	13.532	0.15
7	220 kV Moga - 132 kV Dhaleke	1	19	0.2
8	132 kV Dhaleke - Dharamkot	1	20	0.2
9	220 kV Moga - 132 kV Gholia Kalan	1	16.2	0.2
10	132 kV Smadh Bhai - Gholia Kalan	1	7	0.2
11	220 kV Baghapurana - 132 kV Kotkapura	1	34.6	0.2
12	220 kV Moga - 132 kV Moga Ckt-1	1	7.5	0.2
13	220 kV Moga - 132 kV Moga Ckt-2	1	2.7	0.2
14	132 kV Line from 220 kV GNDTP, Bathinda-Balluana	1	14.15	0.2
15	132 kV Balluana-Gidderbaha	1	19.15	0.2
16	132 kV Gidderbaha-Malout	1	19.7	0.2
17	132 kV Gidderbaha-Badal	1	15.316	0.2
18	132 kV Gidderbaha- M/s Channu	1	9.5	0.2
19	132 kV Line from GNDTP, Bathinda - IGC Bathinda	1	16.76	0.2
20	132 kV IGC Bathinda - Maur	1	32.87	0.2
21	132 kV Bathinda-NFL	2	2	0.2
22	132 kV Bathinda-MES	1	11.23	0.2
23	132 kV Ferozpur-Sadiq	1	24	0.2
24	132 kV Sadiq-FaridKot	1	17	0.2
25	132 kV Ferozpur-Mana singh wala	1	11.6	0.15
26	132 kV Ferozshah-Mana singh wala	1	10	0.15
27	132 kV Talwandi Bhai- Ferozshah	1	18.6	0.15
28	220 kV Mukatsar - 132 kV Mukatsar	2	1.3	0.4

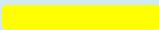
Sl. No.	Name of Line	No.of Ckts	Route Length (Km)	Conductor Size
29	220 kV Mukatsar - 132 kV Jalalabad	1	33	0.2
30	132 kV Mukatsar-Kotkapura	1	28.4	0.2
31	132 kV Mukatsar-Malout	1	32.4	0.2
32	132 kV Malout-Abohar	1	29.64	0.2
33	132 kV Mukatsar-Sarainaga	1	12.73	0.15
34	132 kV Mukatsar - 220 kV Sadiq	1	31	0.2
Ludhiana Circle				
A	220 kV Lines			
1	220 kV Jamalpur - Dhandari Kalan	2	3.53	0.4
2	220 kV Dhandari Kalan - Lalton Kalan	1	20.22	0.4
3	220 kV Dhandari Kalan - 400 kV PGCIL Ludhiana	1	22.357	0.4
4	220kV Kohara - Gaunsgarh	1	22.659	0.5
5	220 kV Kohara - Sahnewal	1	14.194	0.5
6	220kV GGSSTP, Ropar - Gaunsgarh	1	77.071	0.5
7	220kV Sahnewal - Doraha	2	8.775	0.4
8	220kV Jamalpur - Ganguwal	2	78	0.4
9	220kV Lalton Kalan - PGCIL CKT-1	1	2.137	0.4
10	220kV Lalton Kalan - PGCIL CKT-2	1	2.787	0.4
11	220kV Lalton Kalan - PGCIL CKT-3	1	6.738	0.4
12	220 kV Lalton Kalan-Jagraon	1	33	0.4
13	220 kV Lalton Kalan - Humbran	1	18.144	0.4
14	220 kV Lalton Kalan - Sahnewal	1	19.32	0.4
15	220 kV FZR. Road Ludhiana- Lalton Kalan	1	18.466	0.4
16	220 kV FZR. Road Ludhiana - Humbran	1	18.802	0.4
17	220kV Sahnewal - 400 kV PGCIL Ludhiana	1	19.418	0.4
18	220kV Sahnewal - Railway ckt-I&II	2	3.5	0.4
19	220kV Sahnewal-Ghulal	1	74.18	0.4
20	220kV Pakhowal - 400 kV PGCIL Ludhiana	1	13.986	0.4
21	220 kVJagraon - 400 kV PGCIL Ludhiana	1	33.587	0.4
22	220 kV Gobindgarh - 220 kV GGSSTP, Ropar ckt-1&2	2	61	0.4
23	220 kV Gobindgarh - 220 kV GGSSTP, Ropar ckt-3&4	1	63.194	0.4
24	220kV Ikhola-Malerkotla	1	42	0.4
25	220kV Gobindgarh-III - Gobindgarh-I	1	7	0.4
26	220kV Gobindgarh-II - Ganguwal	2	74	4
27	LILO of 220kV GGSSTP, Ropar - Gobindgarh-I at 220 kV Bassi Pathana	1	5.903	0.4
28	220kV Ghulal- GGSSTP, Ropar	1	63.092	0.5
B	132 kV Ludhiana			
1	132 kV Doraha-Bilaspur	1	9	0.15
2	132kV Bilaspur Sihora	1	15	0.15
3	132kV Ghulal-Jamalpur ckt-1 &II	2	21	0.15
4	132 kV Ghulal -Doraha	1	13	0.2
5	132kV Ghulal-Shamshpur-Seh	1	7	0.2

Sl. No.	Name of Line	No.of Ckts	Route Length (Km)	Conductor Size
6	132kV Phillaur-Jamalpur	1	17	0.15
7	132 kV Phillaur-Goraya	1	12	0.15
8	132 kV Goraya-Jamalpur	1	30	0.15
9	132kV Goraya-Phagwara	2	13	0.15
10	132kV Moga-Jamalpur	1	75	0.125
11	132kV Moga-Swadi Kalan	1	42	0.2
12	132kV Jamalpur-Swadi Kalan	1	38	0.2
Jalandhar Circle				
A	220 kV Lines			
1	Dasuya - Jalandhar	2	56	0.4
2	Dasuya - 400 kVJalandhar PGCIL	2	50	0.4
3	Dasuya - Sarna	2	58	0.4
4	Jamsher-Sultanpur	1	40.625	0.4
5	Jamsher- Badshahpur	1	18.387	0.4
6	Badshahpur- Sultanpur	1	36.7	0.4
7	BBMB Jalandhar-Jamsher	2	28.278	0.4
8	Mahilpur-Jamsher	1	47.375	0.4
9	Mahilpur-Rehana Jattan	1	26.708	0.4
10	Rehana Jattan- Jamsher	1	29.649	0.4
11	220 kV GGSSTP,Ropar - Jamsher	1	104.7	0.4
12	220 kV GGSSTP,Ropar - Goraya	1	92.92	0.4
13	Goraya-Jamsher	1	27.98	0.4
14	Jamsher-Kotla Janga	2	30.328	0.4
15	400 kV Jalandhar PGCIL - Kartartarpur	1	5.73	0.4
16	Kartarpur-KotlaJanga	1	29.92	0.4
17	400 kV Jalandhar PGCIL - KotlaJanga	1	35.655	0.4
18	Jamsher-Chareru Railway	1	10.12	0.2
19	Dasuya - Railway Yard	1	2.765	0.4
20	400 kV Jalandhar PGCIL - 220 kV Kanjli	2	23.882	0.4
21	Goindwal Sahib - Sultanpur	2	37.83	0.4
22	400 kV Nakodar- 220 kV Nurmehar	2	30.78	0.4
B	132 kV Lines			
1	Bhogpur-Mukerian	1	66	0.2
2	Bhogpur-Tanda	1	26	0.2
3	Tanda-Mukerian	1	50	0.2
4	Anandpur Sahib-Nawanshahar	1	57.997	0.2
5	Anandpur Sahib-Jadla	1	58.8	0.2
6	Jadla-Nawanshahar	1	21.391	0.2
7	Jalandhar - Kahanpur	1	9	0.2
8	Kahanpur- Bhogpur	1	18	0.2
9	Bhogpur-Alawalpur	1	12.4	0.2
10	Alawalpur-Jalandhar	1	11.8	0.2
11	Kapurthala-Science City	1	6.684	0.2



Sl. No.	Name of Line	No.of Ckts	Route Length (Km)	Conductor Size
12	Kapurthala-Rail Coach Factory	1	8	0.2
13	Kapurthala-Kheramandir	1	13	0.2
14	Kheramandir-Sultanpur	1	12	0.2
15	Mahilpur-Banga	1	27.8	0.2
16	Hoshiarpur-Mahilpur Ckt. 1	1	25.5	0.2
17	Hoshiarpur-Mahilpur Ckt. 2	1	25.002	0.2
18	Chohal-Hoshiarpur	1	10.6	0.2
19	Bhogpur-Hoshiarpur	1	27.087	0.2
20	Nawanshahar-Goraya	1	32	0.2
21	Phagwara-Banga	1	20	0.2
22	Banga-Nawanshahar	1	14	0.2
23	Jalandhar-Focal Point	1	8	0.2
24	Focal Point-Kartarpur	1	12	0.2
25	Kartarpur- Beas	1	27	0.2
26	Beas-Butari	1	13	0.2
27	Jalandhar-Dhilwan	1	37	0.2
28	Dhilwan-Butari	1	18	0.2
29	BBMB Jalandhar-Urban Estate	1	4.194	0.2
30	Urban Estate-Nakodar	1	20.806	0.2
31	Nakodar-Noormahal	1	10.5	0.2
32	Goraya-Noormahal	1	21.5	0.2
33	Jalandhar-Phagwara	1	20	0.15
34	BBMB-Children Park Jalandhar	1	5.32	0.2
35	Children Park-PIMS Jalandhar	1	4.16	0.2
36	PIMS Jalandhar-Science city	1	18.756	0.2
37	Kheramandir-RCF	1	5.418	0.2
Amritsar Circle				
A	220 kV Lines			
1	220kV RSD-Sarna	4	29.6	0.5
2	220kV RSD-ShahpurKandi	2	20	0.4
3	LIL0 220kV Sarna - Wadala Granthian at 220kV S/Stn.Tibber Ckt-I &II	2	0.545	0.5
4	220kV Sarna - Wadala Granthian Ckt-I &II	2	58	0.4
5	220kV Sarna - Wadala Granthian Ckt-III & IV	2	59.258	0.4
6	220kV Verpal - Wadala Granthian Ckt-I &II	2	49.525	0.4
7	220kV Jalandhar - Butari Line	1	57.401	0.4
8	220kV Butari - Verpal	1	30.375	0.4
9	220kV Wadala Granthian – Fatehgarh Churian	2	33.48	0.4
10	220kV Fatehgarh Churian - Civil Line Amritsar	2	23.392	0.4
11	220kV Civil Line Amritsar - Khassa	2	31.44	0.4
12	220kV Butari-Railway Traction	1	0.73	0.4
13	220kV Sultanpur-Patti Ckt-I &II	2	39.395	0.4
14	220kV Verpal-Patti Ckt-I &II	2	37.62	0.4

Sl. No.	Name of Line	No.of Ckts	Route Length (Km)	Conductor Size
15	LILO of 220kV Fatehgarh Churian - Civil Line Amritsar at 220kV Majitha	1	5.345	0.4
16	400 kV Balachack - 220 kV Khassa	2	44	0.4
17	LILO of 220kV Verpal-Patti at 220kV Rashiana	1	6.705	0.4
18	220kV Verpal - 400 kV Balachack	2	1.972	0.5
19	220kV Patti - Algon Line	1	20.5	0.4
20	LILO 220kV Patti-Sultanpur at 220kV Chohla Sahib DC Line	1	4.465	0.4
21	LILO of 220kV Wadal Granthian - Verpal at Udhoke	1	2.5	0.4
22	LILO of 220kV Khassa- C.Line at Chogawan	1	5.593	0.4
23	LILO of 220kV W/Granthian - F.G.Churian at Kotli Surat Mali	1	8.73	0.4
24	400 kV Makhu - 220 kV Mastewal	2	1	0.4
25	400 kV Makhu - 220 kV Dharamkot	2	35	0.4
B	132 kV Lines			
1	132 kV Joginder Nagar - Kangra	2	55.56	0.15
2	132 kV Kangra - Pathankot	1	65	0.15
3	132 kV Pathankot - Sarna	2	7	0.15
4	132 kV Sarna - Gurdaspur	2	30	0.15
5	132 kV Gurdaspur - Dhariwal	2	10	0.15
6	132 kV Dhariwal - Batala	2	19	0.15
7	132 kV Link B/w 220 kV Wadala Granthian - Batala Ckt-I&II	2	7	0.2
8	132 kV MPH-I to MPH-II	2	9.63	0.4
9	132 kV MPH-II to MPH III	2	2.7	0.4
10	132 kV MPH-III to MPH IV	2	9.6	0.4
11	132 kV MPH IV to Shri Hargobindpur	2	30	0.2
12	132 kV Wadala Granthian - Shri Hargobindpur	2	25.04	0.2
13	132 kV Verpal - Naraingarh	2	14.9	0.2
14	132 kV Verka - Kathunangal	1	15.5	0.15
15	132 kV Kathunangal - Batala	1	22	0.15
16	132 kV Verka - Pakharpura	1	20	0.15
17	132 kV Pakharpura - Batala	1	17.8	0.15
18	132kV Verka - Power Colony, Amritsar	1	2.5	0.2
19	132kV Power Colony, Amritsar - Civil Lines	1	2.6	0.2
20	132kV Naraingarh - Civil Lines	1	11.57	0.2
21	132kV Verpal - Mall Mandi,Asr.	1	11.85	0.2
22	132kV Verka - Jandiala Guru	1	19	0.15
23	132kV Mall Mandi - GT.Road, Amritsar	1	0.7	0.2
24	132kV Verpal-Hakima Gate	1	9.94	0.2
25	132kV Tangra-Jandiala Guru	1	9.5	0.15
26	132kV Mall Mandi-Verka	1	4.52	0.2
27	132kV HakimaGate -SakatriBagh, Amritsar	1	12.606	0.2

Sl. No.	Name of Line	No.of Ckts	Route Length (Km)	Conductor Size
28	132kV Butari-Tarn Taran	1	10.381	0.2
29	132kV Verpal-Tarn Taran	1	14.48	0.2
30	132kV Patti-Tarn Taran	1	24.5	0.2
31	132kV Patti-Bhikhiwind	1	19.37	0.2
32	Tee-off 132kV Tarn Taran-Butari-at Ekalgadda	1	10.88	0.2
33	132kV Sultanpur –Patti	1	37.25	0.2
34	132 kV Mamun - Pathankot	1	8	0.15
35	132 kV Mamun - Kangra	1	65	0.15
36	132kV Tangra- Butari	1	7.5	0.15
Inter-State Lines				
A	220 kV Lines			
1	220 kV Abdullapur to Ganguwal	1	110	0.4
2	220 kV Bhakra Left to Ganguwal	2	30	0.4
3	220 kV Bhakra Left to Ganguwal	1	30	0.3
4	220 kV Bhakra Right to Ganguwal	2	30	0.4
5	220 kV Bhakra Right to Jamalpur	2	86.4	0.4
6	220 kV Bhakra Right to Mahilpur	2	52	0.4
7	220 kV Dehar to Ganguwal	2	55.7	0.5
8	220 kV Dhulkot to Ganguwal	2	150	0.4
9	220 kV Hamirpur to Jalandhar	2	50	0.4
10	220 kV Hiranagar to Sarna	1	55	0.4
11	220 kV Kishanpur to Sarna	2	110	0.4
12	220 kV Nalagarh to Mohali-I	2	52.4	0.4
13	220 kV Pong to Dasuya	2	42	0.4
14	220 kV Pong to Jalandhar	2	98	0.3
15	220 kV RSD to Jassur	1	25	0.4
16	220 kV Sangrur to Hisar	2	110	0.4
17	220 kV Udhampur to Sarna	1	50	0.4
B	132 kV Lines			
1	132 kV Hamirpur to Chohal	1	66	0.2
2	132 kV Kangra to Mamun	1	65	0.15
3	132 kV Kangra to Pathankot	1	69	0.15
4	132 kV Kotla to Ganguwal	2	18	0.2
5	132 kV Kotla to Ropar	3	38	0.2
6	132 kV Pinjore to Ropar	2	60	0.2
NOTE :  Represents Lines from Generating Points of Punjab				

List of 400 kV Transmission Lines of Punjab				
Sl. No.	Name of Line	No.of Ckts	Route Length (Km)	Conductor Size
A	Intra-state Lines			
1	400 kV Rajpura - Dhuri	2	84.873	Twin Moose
2	400 kV Rajpura TPS - Nakodar	2	137	Twin Moose
3	400 kV Nakodar - Makhu	2	52.72	Twin Moose
4	400 kV Talwandi Sabo - Dhuri	2	86	Twin Moose
5	400 kV Mukatsar - Makhu	2	95.5	Twin Moose
6	400 kV Talwandi Sabo - Mukatsar	2	100.3	Twin Moose
7	400 kV Makhu - Balachak (Amritsar)	2	64	Twin Moose
8	400 kV Talwandi Sabo - Nakodar	1	150	Twin Moose
9	400 kV Rajpura TPS - Rajpura	2	11	Twin Moose
10	400 kV Talwandi Sabo - Moga	1	86	Twin Moose
11	400 kV Moga - Nakodar	1	64	Twin Moose
12	400 kV Faggan Majra- Malerkotla	2	80	Twin Moose
13	400 kV Malerkotla - Ludhiana	1	65	Twin Moose
14	400 kV Ludhiana - Jalandhar	1	62	Twin Moose
15	400 kV Jalandhar - Balachak (Amritsar)	1	80	Twin Moose
B	Inter-State Lines			
1	400 kV Dadri - Malerkotla	1	310	Twin Moose
2	400 kV Fatehabad - Moga	1	111	Twin Moose
3	400 kV Hisar- Moga	1	211	Twin Moose
4	400 kV Jalandhar – Chamera	2	153	Twin Moose
5	400 kV Kaithal – Phagan Majra	2	75	Twin Moose
6	400 kV Kishanpur to Moga	2	290	Quad Bersimis
7	400 kV Nalagarh - Phagan Majra (Patiala)	2	75	Twin Moose
8	400 kV Ludhiana - Koldam	2	153	Tripple Zebra

132 kV SUB STATIONS

Sl. No	Name of Substation	132/66 kV T/F	132/66-33 kV T/F	132/33 kV T/F	132/33-11 kV T/F	132/11 kV T/F	66/11 kV T/F	Installed Capacity (MVA)	Remarks
1	Abohar	1x40/50	1x20/25+ 1x25			1x10/12.5+1x16/20		132.5	
2	Alawalpur	1x20/25				1x20		45	
3	Anandpur Sahib	1x40/50+ 1x50				1x10/12.5+1x12.5		125	
4	Asron					2x10/12.5		25	
5	Badal		1x40/50+ 1x20/25			1x16/20	1x12.5	107.5	
6	Badni Kalan	1x20/25+ 1x16/20				1x10/12.5+1x16/20		77.5	
7	Baluana					1x10/12.5		12.5	
8	Banga	1x30/40	1x24/40			1x20+1x16/20		120	
9	Batala	1x40/50				1x16/20		70	Addl. 25 MVA. 132/66 kV T/F Civil work is in progress
10	Beas					1x10/12.5		12.5	
11	Bhikhiwind	1x40/50+ 1x50				2x12.5		125	
12	Bhogpur		1x50+ 1x20/25			1x20+1x10/12.5		107.5	
13	Bilaspur					1x10/12.5+1x12.5		25	
14	Chamkaur Sahib					1x20+1x16/20		40	
15	Children Park					2x20		40	
16	Chohal		1x50+ 1x20/25	1x12.5/ 16		1x10/12.5		103.5	
17	Dhalleke					1x16/20+1x10/12.5			
18	Dhariwal		1x50			2x16/20		90	
19	Dhilwan					1x16/20+1x10/12.5		32.5	
20	Ekalgadda					1x10/12.5		12.5	
21	Faridkot					1x16/20+1x10/12.5		32.5	



Sl. No	Name of Substation	132/66 kV T/F	132/66-33 kV T/F	132/33 kV T/F	132/33-11 kV T/F	132/11 kV T/F	66/11 kV T/F	Installed Capacity (MVA)	Remarks
22	Ferozshah	1x40/50+ 1x16/20				1x20+1x10/12.5		102.5	
23	Gidderbaha					1x16/20+1x10/12.5		32.5	
24	Gholiankalan					1x20		20	
25	Gurdaspur	2x40/50				1x20+1x16/20		140	
26	G.T. Road Asr	1x16/20+ 1x20/25				1x20+1x16/20+1x12.5		97.5	
27	Hakima Gate					1x20+1x16/20		40	
28	Hoshiarpur	2x50	1x20/25			1x20+1x12.5/16		161	
29	I.G.C. BTI	1x20/25+ 1x50				1x10/12.5		87.5	
30	Jadla	1x40/50				1x20		70	
31	Jallalabad	1x10/12.5/ 16.67				2x20	1x12.5	69.17	
32	Jandiala Guru					1x16/20+1x12.5		32.5	
33	Kangra					1x2		2	
34	Kapurthala	1x40/50+ 1x20/25				1x16/20+1x20		115	
35	Kathunangal	1x40/50				1x20+1x12.5		82.5	
36	Khera Mandir					2x20		40	
37	Kotkapura-1	1x20/25+ 1x50				1x20+1x10/12.5		107.5	
38	Kahanpur					1x20		20	
39	Kotkapura-2					1x20		20	
40	Mall Mandi ASR					1x20+1x16/20		40	
41	Malout	1x12.5/16+ 1x20/25				1x20+1x12.5	1x7.5	81	
42	Mamoon					1x10/12.5+1x12.5		25	
43	Mana Singh Wala					2x12.5		25	
44	Maur	2x16/20				2x20		80	
45	Moga-1	1x50+ 1x20/25				1x20+1x16/20		115	



Sl. No	Name of Substation	132/66 kV T/F	132/66-33 kV T/F	132/33 kV T/F	132/33-11 kV T/F	132/11 kV T/F	66/11 kV T/F	Installed Capacity (MVA)	Remarks
46	MPH-I,II,III,IV								
47	Muktsar	1x40/50+ 1x16/20				1x20+1x16/20		102.5	
48	Nakkian					1x10/12.5		12.5	
49	Nakodar	1x40/50+ 1x12.5/16				1x16/20+1x20		106	
50	Nariangarh	2x40/50				1x16/20+1x10/12.5		132.5	
51	Nawanshahar	1x40/50+ 1x30/40				1x16/20+1x20		130	
52	P.Colony ASR					1x16/20+1x20		40	
53	Pakharpura					1x20		20	
54	Panjraian					2x10/12.5		25	
55	Pathankot	1x12.5/16		1x12.5/ 16		1x16/20+1x20		72	
56	Phagwara	1x40/50+ 1x20/25				2x20		115	
57	Phillaur	1x12.5/16				1x16/20+1x12.5		48.5	
58	Ropar	2x50				2x20		140	
59	Samadh Bhai	1x30/40				1x16/20+1x10/12.5		72.5	
60	Sarainaga	1x16/20			1x20/ 10/10	1x12.5		52.5	
61	SC City Ibban (Wadala Khurd)					1x20		20	
62	Shamashpur (Samrala)					1x20+1x12.5		32.5	Addl. 12.5 MVA. 132/11 kV T/F work is in progress
63	Sihora					1x20		20	
64	Sheh					2x12.5		25	
65	Sosan					1x10/12.5		12.5	



Sl. No	Name of Substation	132/66 kV T/F	132/66-33 kV T/F	132/33 kV T/F	132/33-11 kV T/F	132/11 kV T/F	66/11 kV T/F	Installed Capacity (MVA)	Remarks
66	Sri Hargobindpur	1x40/50+ 1x16/20				1x16/20+1x20		110	
67	Swadi Kalan					1x20+1x12.5		32.5	
68	Tanda					1x16/20+1x12.5		32.5	
69	Tangra					1x20+1x12.5		32.5	
70	TarnTaran	1x40/50+ 1x20/25				1x16/20+1x10/12.5		107.5	
71	Urban Estate Phase II					2x20		40	
72	Verka	1x40/50				1x20+1x16/20	1x20	110	
73	PIMS Jalandhar					1x12.5		12.5	
74	Sakatri Bagh					2x20		40	
75	Focal Point Jalandhar					2x20		40	



Details of Year Wise Ongoing/ Planned Intra-State Transmission System

Summary of Intra State & Transmission system investment

SL No	Financial Year	Investment Rs. (Crores)
1	2015-16	500
2	2016-17	395
3	2017-18	260
4	2018-19	170
Total Investment in Intra state		1325

Details of Year Wise Ongoing/ Planned Intra-State Transmission System

FY 2014-15				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms.	Est. Cost (in Lakhs)	Remarks
A	New Substations			
1	220 kV Badal (U/G from 132 kV)	1x100 MVA, 220/66 kV	789	U/Progress (Spilled over to Year 2015-16)
2	220 kV Abohar (U/G from 132 kV)	1x100MVA, 220/66 kV	789	U/Progress (Spilled over to Year 2015-16)
3	220 kV S/S Bhawanigarh (U/G from 66kV)	1x160MVA, 220/66 kV	1178 (approx.)	U/Progress (Spilled over to Year 2015-16)
4	220 kV Bhari (U/G from 66 kV)	1x160MVA, 220/66 kV T/F	1060	U/Progress (Spilled over to Year 2015-16)
5	220 kV Hoshiarpur (at old location)	1x160 MVA, 220/66 kV T/F	1249	U/Progress (Spilled over to Year 2015-16)
6	220 kV S/S Majra (U/G from 66 kV)	1x160MVA, 220/66 kV T/f	669	U/Progress (Spilled over to Year 2015-16)
7	220 kV S/S Ladowal (New)	1x160MVA, 220/66 kV T/f	1032	U/Progress (Spilled over to Year 2015-16)
8	220 kV S/S Science City (Up-graded from 132 kV)	1x100MVA, 220/132 kV AutoT/f.	672	U/Progress (Spilled over to Year 2015-16)
9	220 kV Grid Giaspura (U/G from 66 kV)	1x160MVA, 220/66 kV T/f	1060	Under Consideration
10	220 kV Naraingarh (U/G from 132 kV)	1x160 MVA, 220/66 kV T/F	1031	U/Progress (Spilled over to Year 2015-16)
11	220 kV Jadla (U/G from 132 kV)	1x100 MVA, 220/66 kV	1086	U/Progress (Spilled over to Year 2015-16)
		1520 MVA	10615	
B	Augmentation			
1	400 kV Mukarsar (Aug) 2x315MVA, 400/220 kV	1x500MVA, 400/220 kV	5615	Spilled over to Year 2015-16
2	400 kV Dhuri (Aug) 2x500MVA, 400/220 kV	1x500 MVA, 400/220 kV	5615	Spilled over to Year 2015-16

FY 2014-15				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms.	Est. Cost (in Lakhs)	Remarks
3	220 kV Mehal Kalan (Addl 3 rd)	Addl.100MVA, 220/66 kV T/F as spared from 220 kV Barnala shall be used.		U/Progress (Spilled over to Year 2015-16)
4	220 kV Devigarh (Aug)	Addl. 160MVA, 220/66 kV T/F	886	U/Progress (Spilled over to Year 2015-16)
5	220 kV Rehana Jattan (Aug 2 nd T/f)	Addl. 100MVA, 220/66 kV as spared from 220 kV Doraha.		Commissioned
6	220 kV Kanjli (Aug 2 nd T/f)	Addl.100MVA, 220/66 kV T/F	472.5	U/Progress (Spilled over to Year 2015-16)
7	220 kV Banur (Aug 2 nd T/f)	Addl. 100MVA,220/66 kV T/F	472.5	Commissioned
8	220 kV Bassi Pathana (Aug 2 nd T/f)	Addl. 100MVA, 220/66 kV T/F	472.5	U/Progress (Spilled over to Year 2015-16)
9	220 kV Nurmehar (Aug 2 nd T/f)	Addl. 100MVA, 220/66 kV T/F	472.5	U/Progress (Spilled over to Year 2015-16)
10	220 kV S/Stn. Badshahpur (1x100MVA, 220/66 kV T/F)	Addl . 1x100 MVA, 220/66 kV T/F	701	U/Progress (Spilled over to Year 2015-16)
11	220 kV S/S Ghubaya 2x100MVA 220/66 kV T/F 1x50MVA,220/66 kV T/F	Replacement of 1x50 MVA, 220/66 kV T/F with 1x100 MVA, 220/66 kV T/F	510	Commissioned
12	220 kV S/S Mahilpur 2x100MVA,220/132 kV T/F2x12.5/16MVA,132/66-33 kV T/F 1x50MVA,132/66 kV T/F 1x20MVA,132/11 kV T/f	Replacement of 1x50MVA,132/66 kV +2x12.5/16MVA, 132/66-33 kV T/Fs with 1x100MVA, 220/66 kV T/F	510	U/Progress (Spilled over to Year 2015-16)
13	220 kV Sarna 1x100MVA,220/132 kV 1x100MVA,220/66 kV	Addl.1x100MVA, 220/132 kV auto T/f	498	U/Progress (Spilled over to Year 2015-16)
14	220 kV S/S Mohali-1 (3x100MVA, 220/66kV T/fs	Replacement of 1x100MVA, 220/66 kV T/f with 1x160MVA, 220/66 kV T/f	714	Commissioned
15	220 kV Chohla Sahib 1x100MVA, 220/66 kV	Addl.1x100MVA,220/66 kV T/f	689	Commissioned
16	220 kV Algon (Aug) 1x100MVA, 220/66 kV T/f	Addl. 1x100MVA,220/66 kV T/f	689	Commissioned
17	220 kV GNDTP Bathinda (Aug)	Addl.1x100MVA, 220/66 kV T/f	689	U/Progress (Spilled over to Year 2015-16)
18	220 kV Abohar	Aug. of 10/12.5MVA, 132/11 kV T/F to 20MVA, 132/11 kV	150	
19	220 kV Abohar	Aug. of 10/12.5 MVA, 132/11 kV T/F to 20 MVA, 66/11 kV	162	
20	220 kV Dharamkot	Addl. 20 MVA, 66/11 kV T/F to replace 20 MVA, 132/11 kV T/F	30	Commissioned
21	220 kV Rashiana	Aug. of 12.5 MVA, 66/11 kV T/F to 20 MVA, 66/11 kV T/F	162	

FY 2014-15				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms.	Est. Cost (in Lakhs)	Remarks
22	220 kV Mukatsar Sahib	1 no. Addl. 12.5 MVA, 132/11 kV T/F	30	U/Progress (Spilled over to Year 2015-16)
23	220 kV Udhoke	Aug. of 10/12.5MVA, 66/11 kV T/F to 20 MVA, 66/11 kV T/F	162	
24	220 kV Mohali-I	Addl. 12.5 MVA, 66/11 kV T/F	30	Commissioned
25	220 kV Bahadurgarh	1no. Addl. 12.5MVA, 66/11 kV T/F	30	
26	220 kV Jamsher	1no. 20 MVA, 66/11 kV T/F to repl 1x10/12.5 MVA 66/11 kV T/F	167	
27	132 kV S/Stn. Nur-Mehar (being U/G to 220 kV)	1x20 MVA, 66/11 kV T/F to repl. 12.5 MVA, 132/11 kV T/F	284	U/Progress (Spilled over to Year 2015-16)
28	132 kV S/Stn. Bathinda	Addl. 12.5 MVA, 132/11 kV T/F	30	
29	132 kV S/Stn. Ropar	Addl. 12.5 MVA, 66/11 kV T/F	30	
30	132 kV S/Stn. Tarn Taran	Addl. 16/20 MVA, 132/66 kV T/F	30	
31	132 kV Sarainaga	Aug. Of 16/20 MVA, 132/66 kV T/F to 40/50 MVA, 132/66 kV T/F	30	
		Aug. Of 20/10/10 MVA, 132/33/11 kV T/F to 12.5 MVA, 132/11 kV T/F	30	
32	132 kV Hoshiarpur	1no. Addl. 25 MVA, 132/66 kV T/F	50	Commissioned
33	132 kV Chohal	Addl. 50MVA, 132/66-33 kV T/F	30	Commissioned
		2460	20443	
C	Lines			
1	LILO of 220 kV Malout - Bathinda SC line at 220 kV Badal	30 Km/0.4 Sq"	940.08	U/Progress (Spilled over to Year 2015-16)
2	220 kV SC line from 400 kV Mukatsar - 220kV Sandhwan	39.320 Km (appx)/0.4Sq"	2474.02	U/Progress (Spilled over to Year 2015-16)
3	220 kV line from 400 kV Mukatsar to 220 kV Abohar DC on DC	46.2Km/0.4Sq" (appx)	1106	U/Progress (Spilled over to Year 2015-16)
4	220 kV Goindwal Sahib - 220 kV Bottianwala DC line	40Km/0.4Sq" DC on DC tower	1376.8	U/Progress (Spilled over to Year 2015-16)
5	400 kV Nakodar - 220 kV Kartarpur DC line	44.8.Km (appx)/0.4Sq" DC on DC tower	1527.6	Commissioned
6	220 kV Abohar - 220 kV Malout SC on DC line	22 Km/0.4Sq" (appx)	618	U/Progress (Spilled over to Year 2015-16)
7	220 kV DC line from 400 kV Makhu to 220 kV Rashiana	30 Km (approx.)/ 0.4Sq" DC on DC towers	1062.6	U/Progress (Spilled over to Year 2015-16)
8	220 kV DC line from 400 kV Makhu - 220 kV Algon	30 Km (appx)/0.4Sq" DC on DC	1062.6	U/Progress (Spilled over to Year 2015-16)
9	220 kV DC line from 400 kV Rajpura to 220 kV Devigarh.	20 Km(approx)/0.4Sq" DC on DC towers	628.4	U/Progress (Spilled over to Year 2015-16)

FY 2014-15				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms.	Est. Cost (in Lakhs)	Remarks
10	220 kV DC line from 400 kV Mukatsar to 220 kV Ghubaya	40.3 Km (appx)/0.4Sq" SC on DC	1066	Commissioned
11	LILO of both ckt. of 220 kV Patiala – Gobindgarh-1 DC line at 400 kV Rajpura	25 Km (appx)/0.4Sq" 2xDC on DC	1571	U/Progress (Spilled over to Year 2015-16)
12	220 kV DC line from 400 kV Rajpura - 220 kV Lalru	20Km (appx)/0.4Sq" DC on DC	628.4	U/Progress (Spilled over to Year 2015-16)
13	220 kV SC line from 400 kV Mukatsar - 220 kV Malout	23.575 Km (appx)/0.4Sq"	1483.34	U/Progress (Spilled over to Year 2015-16)
14	400 kV Ludhiana - 220 kV Doraha SC on DC towers	18 Km/ 0.4Sq"	476.1	U/Progress (Spilled over to Year 2015-16)
15	220 kV line from 400 kV Nakodar - 220 kV Rehana Jattan DC line	35 Km/0.4Sq" DC on DC	1099.7	U/Progress (Spilled over to Year 2015-16)
16	220 kV Goindwal Sahib - 220 kV Chohla Sahib DC line.	32 Kms/0.4Sq" DC on DC tower.	1005.4	U/Progress (Spilled over to Year 2015-16)
17	LILO of 400 kV PGCIL Moga - 220 kV Jagraon at 220 kV Himmatpura	32 Km DC on DC	1125.44	Commissioned
18	400 kV PGCIL Moga - 220 kV Mehal Kalan DC line	50Km DC on DC	1811	U/Progress (Spilled over to Year 2015-16)
19	LILO of 2 nd ckt, of 400 kV PGCIL Jalandhar – 220 kV Kotla Jagan (Nakodar) at 220 kV Kartarpur	2Km DC on DC	182.84	Commissioned
20	220 kV Bajakhana - 220 kV Baghapurana DC on DC line with 0.4Sq" conductor	30 Km DC on DC	1062.6	U/Progress (Spilled over to Year 2015-16)
21	LILO of 2 nd ckt of 220 kV Patiala – Patrana at 220 kV S/S Rajla	12Km/0.4Sq"	395.84	Commissioned
22	220 kV S/S Talwandi Bhai to 220 kV S/S Dharamkot (village Karial proposed)	Appx.25 Km/ Twin Zebra SC on DC	1424.75 (appx)	U/Progress (Spilled over to Year 2015-16)
23	LILO of one circuits of 220 kV Nakodar (400 kV) - 220 kV Rehana Jattan at 220 kV Hoshiarpur	i) On multi-ckt. Tower = 3Kms at Hoshiarpur end (with 0.4Sq"cond.)	397.5 (approx.)	U/Progress (Spilled over to Year 2015-16)
		ii) DC on DC tower = 25Km (with 0.4Sq"cond.)	1860 (approx.)	
24	400 kV S/S Balachak - 220 kV Naraingarh	Length = 19.5 Km(0.4Sq"/SC on DC Tower) +2.5Km (On Multi Ckt tower)	15.57	U/Progress (Spilled over to Year 2015-16)

FY 2014-15				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms.	Est. Cost (in Lakhs)	Remarks
25	Stringing of 2nd ckt of 220 kV line from 400 kV Balachak to 220 kV Naraingarh	Length =19.5Km + 2.5Km on Multi Ckt DC on DC tower with 0.4Sq" Zebra Conductor with 0.4Sq" Zebra Conductor.	252.56	U/Progress (Spilled over to Year 2015-16)
26	LILO of one Ckt of 220 kV Ganguwal -Gobindgarh-II line at 220 kV Bhari	i) DC on DC Towers = 1.534 Km (with 0.4Sq" conductor)	114.13	U/Progress (Spilled over to Year 2015-16)
		ii) On Multi-Ckt tower = 1.50Km at Bhari end (with 0.4Sq" conductor)	198.77	
27	LILO of one Ckt of 220 kV Ganguwal-Mohali-1 line at 220 kV S/S Majra	i) DC on DC Tower = 8.13 Km (with 0.4Sq" conductor)	604.88	U/Progress (Spilled over to Year 2015-16)
		ii) On Multi Ckt. towers = 2.50 Km (with 0.4Sq" conductor)	331.28	
28	LILO of 220 kV Lalton Kalan- Dhandari Kalan at 220 kV grid Giaspura	4Km (apppx) DC on DC with 0.4Sq" Conductor size)	228	Under Consideration
29	LILO of 132 kV Nakodar – Urban Estate Ph-2 Jalandhar – BBMB Jalandhar at 220 kV Kotla Jangan's (132 kV bus)	LILO length = 4Km (appx) (DC on DC)	200	Commissioned
30	220 kV DC line from 400 kV Nakodar to 220 kV Ladowal (New)	40 Km (appx.)/ 0.5Sq" DC on DC	2795	U/Progress (Spilled over to Year 2015-16)
31	LILO of one ckt of 220 kV S/S Humbran -220 kV S/S Ferozepur Rd. Ludhiana at 220 kV S/S Ladowal (new)	17 Km (appx.)/ 0.4Sq"	779	U/Progress (Spilled over to Year 2015-16)
32	220 kV S/S Kanjli - 220 kV Science City (U/G from 132 kV)	11 Kms (appx). DC on DC with 0.5Sq" conductor	768.57 (appx.)	U/Progress (Spilled over to Year 2015-16)
33	400 kV Bays for LILO of 2 nd Circuit of 400 kV Talwandi Sabo – 400 kV Nakodar at 400 kV PGCIL Moga	LILO length = 9 Km (appx) DC on DC with Twin Moose conductor	9	U/Progress (Spilled over to Year 2015-16)
34	220 kV Focal Point Nabha – 220 kV Bhawanigarh	i)Length = 18 Kms (SC on DC tower with 0.4Sq" conductor)	1132.6	U/Progress (Spilled over to Year 2015-16)
		ii)Length =1.5Km (SC on Multi Ckt towers with 0.4Sq" conductor)	198.8	U/Progress (Spilled over to Year 2015-16)
35	Providing 2nd ckt on 220 kV Patti - Algon Line	Length = 20.08 with 0.4sq" conductor	249.58	U/Progress (Spilled over to Year 2015-16)
36	LILO of both ckts of 220 kV GGSSTP - Jamsher line at 220 kV Jadla	Length = 10.5 with 0.4sq" conductor	---	U/Progress (Spilled over to Year 2015-16)
		439	34264.67	

FY 2015-16				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms	Est. Cost (in Lac)	Remarks
A	Augmentation			
1	220 kV Chhajli (Aug)	Addl.1x100MVA, 220/66 kV	701	
2	220 kV Algon (Aug 2 nd T/f)	Addl.1x160MVA,220/66 kV	561	
3	220 kV Mastewala (Aug 2 nd T/f)	Addl.1x160MVA,220/66 kV	561	
4	220 kV Sarna (Aug 2 nd T/f)	Addl.1x100MVA,220/66 kV	472.5	
5	220 kV Dasuya (Aug 2 nd T/F)	Addl. 1x100MVA, 220/66 kV	472.5	
6	220 kV Nabha (at new location)	1x160MVA,220/66 kV	561	
7	220 kV Sri Hargobindpur (U/G from 132 kV)	1x160MVA,220/66 kV	1060	
8	220 kV Dhanaula (Aug 3 rd T/f or new grid in nearby area)	Addl.1x160MVA,220/66 kV	561	
9	220 kV Chohla Sahib (Aug 2 nd T/f)	Addl. 1x160MVA,220/66 kV	561	
10	220 kV Rehana Jattan (Addl 3 rd T/f or new grid in nearby area)	1x100MVA,220/66 kV	472.5	
11	220 kV Ablawal (Aug)	Repl. of 1x100MVA with 1x160MVA, 220/66 kV	561	
12	220 kV Malout (Addl 2 nd T/f)	1x160MVA,220/66 kV	561	
13	220 kV Kotla Jagan (Aug)	Repl. of 1x100MVA with 1x160MVA, 220/66 Kv	561	
14	220 kV Lalton Kalan (Aug)	Addl 1x100MVA, 220/66 kV as spared from 220 kV Ablawal shall be used.		
18	220 kV Pakhowal (Addl 3 rd T/F or new grid in the nearby area)	Addl.100MVA, 220/66 kV T/F as spared from 220 kV Kotlajangan shall be used.		
19	220 kV Abohar (Aug 2 nd T/f)	Addl. 100MVA, 220/66 kV T/F	472.5	
20	220 kV Badal (Aug 2 nd T/f)	Addl. 100MVA, 220/66 kV T/F	472.5	
21	220 kV Talwandi Sabo (Aug)	Addl 100MVA, 220/66 kV T/F	472.5	
22	220 kV S/Stn. Kharar (2x100MVA, 220/66 kV T/Fs)	Repl. of 1x100MVA with 1x160MVA, 220/66 kV	894	
23	220 kV Rajpura (2x100MVA, 220/66 kV T/Fs)	Addl. 3rd 1x100 MVA, 220/66 kV T/F	701	
20	220 kV S/Stn. Baghapurana (1x100MVA, 220/66 kV T/F)	Addl. 1x100MVA,220/66 kV T/f	701	
24	132 kV Malout	1no. 20 MVA, 132/11 kV T/F to repl. 1x12.5 MVA, 132/11 kV T/F	192	
			11572	



FY 2015-16				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms	Est. Cost (in Lac)	Remarks
B	Lines			
1	220 kV WadalaGaranthian – Sri Hargobindpur DC line .	35 Km/0.5Sq" DC on DC	1641.75	
2	220 kV Shahpur Kandi PH-1 - 220 kV Shahpur Kandi PH-2	4 Km (SC on DC, 0.5sq" conductor.)	285.9 (approx.)	
3	LILO of one circuit of 220 kV RSD - 220 kV Sarna at 220 kV Shahpur Kandi PH-1 & PH-2	9 Km (DC on DC, 0.5sq" conductor.)	774.9 (approx.)	
			2702.55	

FY 2016-17				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms.	Est. Cost (in Lac)	Remarks
A	Augmentation			
1	220 kV NawanShahar (U/G from 132 kV)	2x160MVA, 220/66 kV	1621	
2	220 kV Talwandi Bhai (Aug)	Addl.1x160MVA, 220/66 kV	561	
5	220 kV Kanjli (Aug 3 rd T/f or a new grid in the nearby area)	Addl 1x160MVA, 220/66 kV	561	
6	220 kV Butriana (Aug)	Addl 1x160MVA, 220/66 kV	561	
7	220 kV Jhunir (Aug 2 nd T/f)	Addl 1x160MVA, 220/66 kV	561	
8	220 kV Jagraon (3 rd T/f or new grid in nearby area)	Addl 1x160MVA, 220/66 kV	561	
B	Lines			
1	400 kV PGCIL Patran - 220 kV Patran	10Km/0.5Sq" DC on DC	640.5	

FY 2017-18				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms	Est. Cost (in Lac)	Remarks
A	New Substation			
1	220 kV Budhlada (U/G from 66 kV)	160 MVA, 220/66 kV T/F	1713	
2	220 kV Gurdaspur	160 MVA, 220/66 kV T/F	1713	
3	220 kV Fazilka (U/G from 66 kV)	160 MVA, 220/66 kV T/F	1713	
		480 MVA	5139	
B	Augmentation			
1	220 kV Hoshiarpur	Addl. 2nd 160 MVA, 220/66 kV T/F	894	
2	220 kV Udhoke	Addl. 2nd 160 MVA, 220/66 kV T/F	894	



FY 2017-18				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms	Est. Cost (in Lac)	Remarks
3	220 kV Tibber	Addl. 2nd 100 MVA, 220/66 kV T/F	701	
4	220 kV Himmatpura	Addl. 2nd 160 MVA, 220/66 kV T/F	894	
5	220 kV Chogawan	Addl. 2nd 160 MVA, 220/66 kV T/F	894	
6	220 kV Bhawanigarh	Addl. 2nd 160 MVA, 220/66 kV T/F	894	
7	220 kV Rashiana (New)	1x160 MVA, 220/66 kV T/F	1713	
8	220 kV Nabha	Addl 3rd 100 MVA T/F	701	
		1160 MVA	7585	
C	Lines			
1	220 kV Mansa - Budhlada DC Line	40 Km/ 0.5 Sq"	3444	
2	220 kV Sarna - Gurdaspur DC line	30 Km/ 0.5 Sq"	2583	
3	400 kV Mukatsar - Fazilka 220 kV DC line	25 Km/ 0.5 Sq"	2153	
4	LILO of 400 kV Makhu - 220 kV Rashiana (Old) at 220 kV Rashiana (New)	20 Km/ 0.4 Sq"	1488	
5	400 kV Patran - 220 kV Rajla	50 Km/ 0.5 Sq" DC on DC	2153	
		330	11821	
Total :			24545	

FY 2018-19				
Sl. No.	Name of Works	Capacity in MVA and Line Length in kms	Est. Cost (in Lac)	Remarks
A	Augmentation			
1	220 kV Gurdaspur	Addl. 2nd 160 MVA, 220/66 kV T/F	894	
2	220 kV Fazilka	Addl. 2nd 160 MVA, 220/66 kV T/F	894	
3	220 kV Sri Hargobindpur	Addl. 2nd 160 MVA, 220/66 kV T/F	894	
4	220 kV Lalru	Addl. 3rd 160 MVA, 220/66 kV T/F	894	
3	220 kV Ferozepur Rd. Ludhiana	3rd 160 MVA T/F	894	
		800 MVA	4470	
B	Lines			
1	400 kV Patran - 220 kV Mansa	70 Km/ 0.5 Sq" DC	6027	
2	400 kV PGCIL Patran - 220 kV Passiana	55 Km/ 0.5Sq" DC	4736	
		250	10763	
Total :			15233	

Note : In addition to the above investment in Transmission System Rs. 26 Crs. for ERP works & Rs. 28 Crs. for SLDC works has been consider FY 2015-16 to FY 2018-19. The total investment year wise (FY 2015-16 to FY 2018-19) has explained in Summary of Intra State & Transmission system investment.



Package wise distribution of towns and approximate cost involved (RAPDRP-B)

Sl. No.	Name of R-APDRP Towns	Zone	Cost of DPRs (Rs. Cr.)	Package	Approx.
1	Abohar	West	22.85	1	271.56
2	Bathinda	West	47.5		
3	Faridkot	West	11.37		
4	Fazilka	West	13.1		
5	Ferozpur Cantt	West	10.68		
6	Ferozpur City	West	20.87		
7	Gidderbaha	West	8.33		
8	Jaitho	West	8.07		
9	Jalalabad	West	11.11		
10	Kotakpura	West	11.91		
11	Malout	West	12.57		
12	Mansa	West	27.96		
13	Moga	West	22.88		
14	Muktsar	West	24.3		
15	Rampuraphul	West	8.28		
16	Zira	West	9.76		
17	Batala	Border	37.97	2	209.15
18	Gurdaspur	Border	14.92		
19	Hoshiarpur	North	38.01		
20	Kapurthala	North	20.35		
21	Nakodar	North	10.08		
22	Pathankot	Border	25.55		
23	Patti	Border	4.3		
24	Phagwara	North	28.99		
25	TaranTaran	Border	16.23		
26	Sunam	South	12.75		
27	Barnala	South	14.33	3	150.52
28	Jagraon	Central	12.41		
29	Kharar	South	10.77		
30	Malerkotla	South	19.54		
31	Nabha	South	15.06		
32	Nangal	South	3.35		
33	Rajpura	South	25.23		
34	Samana	South	11.82		
35	Sangrur	South	24.56		
36	Sirhind	Central	13.44		
37	Amritsar	Border	259.88	4	259.88

Sl. No.	Name of R-APDRP Towns	Zone	Cost of DPRs (Rs. Cr.)	Package	Approx.
38	Jalandhar City	North	195.42	5	195.42
39	Ludhiana 1	East	371.71	6	371.71
40	Ludhiana 2	West		7	
41	Patiala		37.92	Executed Department ally	0
42	Dhuri		7.47	1A	174.49
43	Roop nagar		6.13		
44	Jalandhar cantt		29.86		
45	Khanna		38.08		
46	Mohali		36.99		
47	Nawashahr		18.04		
	TOTAL		1632.7		1632.73

ANNEXURE-VII**DISTRIBUTION REQUIREMENT FOR RURAL AREAS**

To provide 24x7 power supply in the urban areas, Government of Punjab has finalized the following requirement of infrastructure for augmentation of urban infrastructure in the state.

ZONE WISE DETAIL OF ACTIVITIES COVERED IN THE NAD DOCUMENTS FOR DDUGJY

Sl. No.	Item		Unit	South Zone	West Zone	Central Zone	North Zone	Border Zone	Total PSPCL	Unit Rate	Total Amount in Rs. lakhs
				Qty	Qty	Qty	Qty	Qty	Total Qty		
A. Feeder Separation											
1	66 KV Feeder		kms								
2	11 KV Feeder	With 80sq.mm. (Racoon)	kms	9	0	0	0	0	9	8.209	73.88
		With 100sq.mm. (Dog)		0	0	0	0	0	0	8.886	0.00
3	LT Line	With 80sq.mm. (Racoon)	kms	0	0	0	0	0	0	5.902	0.00
		With AB Cable 3Cx95+95sq.mm.		0	0	0	0	0	0	6.944	0.00
4	Distribution Transformer	63KVA	No	0	0	0	0	0	0	1.683	0.00
		100KVA		0	0	0	0	0	0	2.123	0.00
	Total										73.88
B. Strengthening of sub- Transmission Distribution Network											
1	66/11 KV SS :	New Substation with 20MVA T/F	MVA	0	0	0	0	0	0	383.341	0.00
		Additional Transformer with 20MVA T/F		0	0	0	0	0	0	263.339	0.00
		Augmentation Enhancement with 20MVA T/F		0	0	0	0	0	0	199.576	0.00
2	Brief Scope of R&m works in existing 66/11 KV Substations (details of substations & works to be provided	66KV Breakers	No./Set	0	0	0	0	0	0	6.54	0.00



Sl. No.	Item		Unit	South Zone	West Zone	Central Zone	North Zone	Border Zone	Total PSPCL	Unit Rate	Total Amount in Rs. lakhs
				Qty	Qty	Qty	Qty	Qty	Total Qty		
	in DPR) Replacement of:										
		66KV CTs		0	0	0	0	0	0	5.08	0.00
		66KV PTs		0	0	0	0	0	0	0.99	0.00
		66KV Isolators		0	0	0	0	0	0	1.2	0.00
		11KV Capacitor Bank		0	0	0	0	0	0	3.27	0.00
		11KV VCBs		178	27	8	0	0	213	5.92	1260.96
		11KV Bus Coupler 1200/600 A		2	0	2	0	0	4	5.6	22.40
		C & R Pannel		0	0	0	0	0	0	5.08	0.00
		Battery with charger 200 Ah		0	0	0	0	0	0	6.51	0.00
		Any Other item (415 V AC 11 KV CKT. Switch Board /DCDB		0	0	0	0	0	0	0	0.00
3	66 KV feeder	New with 0.2sq.inch (Zebra)	km	0	0	0	0	0	0	19.913	0.00
		New with 0.2sq.inch (Zebra) conductor (DC line on DC Tower)		0	0				0	27.96	0.00
		Augmentation with 0.2sq.inch On Existing Towers		0	0	0	0	0	0	8.03	0.00
		Augmentation with 0.2sq.inch On New Towers		0	0	0	0	0	0	19.913	0.00
4	New 11 KV feeder:		km		0	0					
	New	With 80sq.mm. (Racoon)		267	1148	352	443	1840	4050	5.59	22639.50
		With 100sq.mm. (Dog)		10	3	12	0	0	25	6.26	156.50
		1Ph. 11KV with Weasel 30sq.mm.		59	78	6	64	156	363	2.02	733.26
		11kv Over Head Line with 11kv 35sqmm XLPE Cable		57	77	10	0	0	144	9.53	1372.32
	Augmentation	With 80sq.mm. (Racoon)		490	150	272	1008	272	2192	4.214	9237.09
		With 100sq.mm. (Dog)		10	7.5	26	0	4	47.5	4.46	211.85



Sl. No.	Item		Unit	South Zone	West Zone	Central Zone	North Zone	Border Zone	Total PSPCL	Unit Rate	Total Amount in Rs. lakhs
				Qty	Qty	Qty	Qty	Qty	Total Qty		
5	Distribution Transformer-New	1Ph. 10KVA	MVA/No	188	150	10	222	60	630	0.761	479.43
		3Ph. 25KVA		600	1984	342	528	1932	5386	1.486	8003.60
		3Ph. 63KVA		809	1280	348	690	372	3499	1.683	5888.82
		3Ph. 100KVA		906	747	294	652	210	2809	2.123	5963.51
6	Distribution Transformer-R&M	Augmentation 25KVA to 63KVA	Nos.	285	132	393	519	233	1562	1.096	1711.95
		Augmentation of 63KVA to 100KVA		300	562	312	658	206	2038	1.454	2963.25
		Augmentation of 25KVA to 100KVA		56	242	65	464	120	947	1.454	1376.94
		GO switch replacement		963	0	10955	4499	3327	19744	0.132	2606.21
		Replacement of outgoing Cable with 70sq.mm single core cable	Km	192	348	317	85	26	968	0.092	89.06
		Replacement of outgoing Cable with 95 sq.mm single core cable		199	197	227	183	22	828	0.156	129.17
		Earthing of Transformer	Nos.	4214	528	6840	13059	8133	32774	0.039	1278.19
7	LT Line		km	0	0	0	0	0	0		0.00
	New	With 50sq.mm. (Rabbit)		362	161	481	17	49	1070	3.96	4237.20
		With 80sq.mm. Racocon)		20	15	43	26	15	119	4.89	581.91
		With 30sq.mm (Weasel) for AP		101	0	0	50	8	159	3.15	500.85
	Augmentation	With 50sq.mm. (Rabbit)		427	196	3363	313	62	4361	2.43	10597.23
		With 80sq.mm. Racocon)		19.2	15	42	34	6	116.2	3.36	390.43
		With 30sq.mm (Weasel) for AP		37	542	0	39	0	618	1.6	988.80
8	Capacitor Bank	11KV line (Set of 3x150=450KVAR)	MVAR	170.7	0	27	7.015	141.3	346.015	0.666	230.45
		8KVAR for 63KVA DT		388	0	12.44	6.256	91.26	497.956	0.02	8.96
		12KVAR for 100KVA DT		448.734	0	14.94	19.44	130.536	613.65	0.02	13.50
9	Aerial Bunched	3Cx50+50sq.mm.	KM	184	125	181.32	121	37	648.32	5.29	3429.61



Sl. No.	Item		Unit	South Zone	West Zone	Central Zone	North Zone	Border Zone	Total PSPCL	Unit Rate	Total Amount in Rs. lakhs
				Qty	Qty	Qty	Qty	Qty	Total Qty		
	Cables										
		3Cx95+95sq.mm.		216	181	185.48	189	75	846.48	6.944	5877.96
	Total										92980.89
C. METERING											
1	Feeder		Nos.	33	36	0	0	0	69	0	
2	Distribution Transformer		Nos.	15699	2708	0	7191	0	25598	0	
3	Consumer	Replacement of 1Phase Electromechanical to Electronic Meters	Nos.	47400	0	0	66501	50013	163914	0.025	4097.85
		Replacement of 3Phase Electromechanical to Electronic Meters		343	0	0	3383	0	3726	0.057	212.38
		Relocation of Meters outside Consumer premises		4072	0	0	0	11521	15593	0.048	748.46
	Total										5058.70
	Grand Total										98113.47



ANNEXURE-VIII**DISTRIBUTION REQUIREMENT FOR URBAN AREAS**

To provide 24x7 power supply in the Urban areas, Govt. of Punjab has finalized the following requirement of infrastructure for augmentation of urban infrastructure in the state-

ZONE WISE DETAIL OF ACTIVITIES COVERED IN THE IPDS

Sl. No.	Particular	Unit	CENTRAL ZONE		NORTH ZONE		WEST ZONE		SOUTH ZONE		BORDER ZONE	
			Qty	Project Cost Rs. In Lac	Qty	Project Cost Rs. In Lac	Qty	Project Cost Rs. In Lac	Qty	Project Cost Rs. In Lac	Qty	Project Cost Rs. In Lac
	Renovation & Modernisation of 33/11 kV SS	Nos.	18.00	76.70	8.00	34.10	14.00	59.65	75.00	321.90	1.00	4.26
	11 kV Line : New Feeder/ Feeder Bifurcation	Kms	38.46	325.65	48.83	433.93	49.17	469.23	82.18	730.25	7.48	66.30
	11 kV Line : Augmentation/ Reconductoring	Kms	181.64	758.52	279.28	1448.45	376.52	1833.64	258.84	1196.62	71.67	479.40
	Arial Bunched Cable	Kms	193.90	1319.42	127.27	814.68	146.73	887.27	47.75	289.55	13.90	136.43
	UG Cable	Kms	112.74	1595.26	104.38	1391.83	71.35	805.88	63.75	989.15	23.26	303.92
	Installation of Distribution Transformer	Nos.	242.00	585.86	387.00	873.68	257.00	521.42	343.00	718.25	128.00	276.13
	Capacity enhancement of LT sub-station	Nos.	432.00	1100.81	672.00	1328.34	538.00	952.57	386.00	676.55	184.00	303.77
	LT Line : New Feeder/ Feeder Bifurcation	Kms	31.39	185.26	21.99	129.78	9.00	53.12	22.75	134.27	2.15	12.69
	LT Line : Augmentation/ Reconductoring	Kms	120.50	418.49	175.77	610.32	49.83	173.05	200.17	695.19	28.47	98.87
	Capacitor Bank	Nos.	1272.00	57.66	1890.00	56.21	1307.00	51.23	2057.00	85.18	615.00	23.89
	HVDS	Nos.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Metering	Nos.	50.00	15.43	18088.00	551.61	118.00	27.35	2712.00	16.70	126716.00	3576.35
	Provisioning of solar panel	Lot	51.00	55.00	132.00	132.00	99.00	99.00	74.00	74.00	81.00	66.60



Sl. No.	Particular	Unit	CENTRAL ZONE		NORTH ZONE		WEST ZONE		SOUTH ZONE		BORDER ZONE	
			Qty	Project Cost Rs. In Lac	Qty	Project Cost Rs. In Lac	Qty	Project Cost Rs. In Lac	Qty	Project Cost Rs. In Lac	Qty	Project Cost Rs. In Lac
	RMU,Sectionaliser, Auto reclosures, FPI etc.	Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Others	Lot	1777.00	370.48	0.00	0.00	1021.00	156.08	3193.47	413.35	150.00	21.33
	GRAND TOTAL			6864.54		7804.94		6217.49		6340.97		5369.94



ANNEXURE-IX**Detail of 22 towns covered in the tender and amount sanctioned by MoP GoI (RAPDRP-B)**

Sl. No.	Name of Town	Cost of Sanctioned DPR (Rs. Crores.)
1.	Abohar	22.85
2.	Bathinda	47.50
3.	Faridkot	11.37
4.	Fazilka	13.10
5.	Ferozpur Cantt	10.68
6.	Ferozpur City	20.87
7.	Gidderbaha	8.33
8.	Kotkapura	11.91
9.	Mansa	27.96
10.	Jaito	8.07
11.	Jalalabad	11.11
12.	Malout	12.57
13.	Moga	22.88
14.	Mukatsar	24.30
15.	Rampuraphul	8.28
16.	Zira	9.76
17.	Ropar	06.13
18.	Dhuri	07.47
19.	Mohali	36.99
20.	NawanShahr	18.04
21.	Khanna	38.08
22.	Julludhar Cantt.	29.86
	TOTAL	408.13

ANNEXURE-X

THE FINANCIAL PROGRESS OF PSPCL IN R-APDRP, PART-B AS ON 20.05.2015

										In Rs. lakhs
Sl. No.	Name of Town	Scheme Cost	15% loan Received	invoices Received Till Date from DS Divisions	Expenditure of Shunt capacitors Booked directly By AO/APDRI)	Expenditure of Piller Box BY DS Divisions adjusted	Expenditu re through Bkg Section	Expenditure of WO 13 To WO 52 Booked Directly by AO/R-APDRP	Total expenditure adjusted from PFC loan 8+9+11	Balance 15% Loan (6-12)
1	Ferozpur Cantt	1068.46	160.19	68.71.	3	12.9	0	0	15.9	144.29
2	Moga	2288	343.2				0	0	0	343.2
3	Fazil ka	1310.38	196.79	89.56	6.44	51.6	0	0	58.04	138.75
4	Mukatsar	2430	364.5				0	0	0	364.5
5	Zira	976	146.4				0	0	0	146.4
6	Jaito	807	121.05				0	0	0	121.05
7	Ja lalabad	1111	166.65				0	0	0	166.65
8	Mansa	2796.21	419.37	286.48	10.63	32.25	0	0	42.88	376.49
9	Ferozpur Citv	2087.34	313.18	180.82	7.33	64.5	0	0	71.83	241.35
10	Bathinda	4749.62	712.76	417.14	30.68	226.75	0	0	257.43	455.33
11	Gidderbaha	833.17	124.79	77.88	3.71	77.88	0	0	81.59	43.2
12	Abohar	2285.19	342.58	274.97	9.09	64.5	0	0	73.59	268.99
13	Faridkot	1137	170.39		10.65		0	0	10.65	159.74
14	Malout	1257	188.55				0	0	0	188.55
15	Kota kpura	1191.38	178.79	52.42	10.35	32.5	0	0	42.6	136.19
16	Rampuraohool	828	124.2				0	0	0	124.2
17	Patti	430	64.5				29.59	64.22	64.22	0.28
18	Hoshiarpur	3801	570.15				0	431.53	431.53	138.62
19	Ka pu rthala	2035	305.25				212.48	304.25	304.25	1
20	Phagwara	2899	434.85				136.76	389.26	389.26	45.59
21	Gurdaspur	1492	223.8				361.86	223.44	223.44	0.36
22	Patha n kot	2555	383.25				222.89	377.88	377.88	5.37
23	TaranTaran	1623.17	243.58	98.01	5.42	98.01	47.92	138.7	242.13	1.45



										In Rs. lakhs
Sl. No.	Name of Town	Scheme Cost	15% loan Received	invoices Received Till Date from DS Divisions	Expenditure of Shunt capacitors Booked directly By AO/APDRI)	Expenditure of Piller Box BY DS Divisions adjusted	Expenditure through Bkg Section	Expenditure of WO 13 To WO 52 Booked Directly by AO/R-APDRP	Total expenditure adjusted from PFC loan 8+9+11	Balance 15% Loan (6-12)
24	Bata la	3797	569.55				122.72	567.78	567.78	1.77
25	Nakoder	1008	151.19	71.2	4.58	32.25	247.34	104.49	141.32	9.87
26	Sunam	1275	191.25				180.1	193.85	193.85	-2.6
27	Sirhind	1344	201.6				151.21	200.63	200.63	0.97
28	Nangal	335	50.25				66.77	50.08	50.08	0.17
29	Raipura	2523	378.45				414.56	364.59	364.59	13.86
30	Sangrur	2456	368.4				279.19	349.77	349.77	18.63
31	Malerkotla	1954	293.1				0	290.23	290.23	2.87
32	Samana	1182	177.3				194.14	176.93	176.93	0.37
33	Nabha	1506	225.9				126.08	221.33	221.33	4.57
34	Barnala	1433.4	214.79	287.73	14.82	64.5	266.34	92.97	172.29	42.5
35	Kharar	1077	161.55				239.94	153.1	153.1	8.45
36	Jagraor	1241.49	185.99	205.61	9.18	177.04	183.49	0	186.22	-0.23
37	Amritsar	25988	3897.85		137.74		0	1806.86	1944.6	1953.25
38	Jalandhar City	19542	2931.3				2356.74	1832.18	1832.18	1099.12
39	Ludhiana 1 East	37171	5575.65				4965.69	1850.57	1850.57	1347.59
40	Ludhiana 2 west						3415.54	2377.19	2377.49	
41	Patiala	3792.21	568.76	875.481	57.39	511.442	0	0	568.83	-0.072
42	Dhuri	747	112.05				0	0	0	112.05
43	Roopnagar	613	91.95				0	0	0	91.95
	Total	150976.02	22645.65	2986.011	321.01	1445.872	14231.35	12562.13	14329.01	8316.64



ANNEXURE-XI**Details of Weighted Average Billing Rate**

Description/item	FY 2015-16		FY 2016-17		FY 2017-18		FY 2018-19	
	MU	Rs. Crores	MU	Rs. Crores	MU	Rs. Crores	MU	Rs. Crores
Domestic/General	12458	6601	13932	7382	15581	8256	17428	9235
Others incl. Agriculture	31460	18245	33820	19614	36356	21085	39083	22666
Total	43918	24846	47752	26996	51937	29341	56511	31901
ABR(Rs/unit)	5.66		5.65		5.65		5.65	

Break up of Year wise Investment Plan of PSPCL

Sl. No.	Name of Scheme/Project	FY 2014-15	FY 2015-16	FY 2016-17
	GENERATION			
I	Hydro Electric Projects			
1	Renovation & Modernisation of BBMB Left Bank & Dehar Power House	21.57	25.00	33.00
2	Construction work of Shahpur Kandi HEP	69.38	80.00	90.00
3	Mukerian HEP-II 18 MW	16.06	20.00	5.00
	Total : I (Hydro)	107.01	125.00	128.00
II	Other Works			
1	1320 MW State Sector Thermal Project near Mukerian.	0.00	3.00	150.00
2	Computerization of Thermal Power Plants	0.00	1.00	1.20
3	a. Institute of Power Management, Patiala.	0.00	0.20	0.00
	b. Multi-storied Integrated Corporate office complex Patiala	0.00	5.00	0.00
	c. Renovation of VIP Guest House Anandpur Sahib	0.00	0.60	0.00
	d. Multi-storied office complex at Badunger, patiala		0.00	20.00
	e. Construction of bed for manufacturing 11M long poles		0.45	1.05
	Total : II (other works)	0.00	10.25	172.25
III	Thermal Projects			
1	GHTP Stage-I, Lehra Mohabbat (R & M)	0.06	90.00	21.11
2	GHTP Stage-II, Lehra Mohabbat	9.22		
3	Study of Gas Based power plant at Ropar	0.00	0.00	0.00
	Total : III (Thermal Projects)	9.28	90.00	21.11
IV	R&M of GNDTP			
	a. GNDTP Bathinda based on RLA study			
	b. GNDTP Bathinda other than RLA Study			
	c. Capital Works other than R&M works	19.33	70.00	90.00



Sl. No.	Name of Scheme/Project	FY 2014-15	FY 2015-16	FY 2016-17
	1. Other works			
	2. T&P Items			
	3. Augmentation of the Protection system			
	4. Renovation of Lake View Guest House CE/CD&C			
	Total : IV (R&M of GNDTP)	19.33	70.00	90.00
V	R&M of GGSSTP Ropar			
	1) R&M Stage (I & II)	28.21	35.00	31.89
	2) T&P items			
	3) Strengthening of micro Hydel Channel.			
	4) Const. of 3 No. hTP & ETP			
	5) Other works			
	Total : V (R&M of GGSSTP Ropar)	28.21	35.00	31.89
VI	R&M of PSPCL Hydel Projects			
	Ranjit Sagar Dam	37.42	30.00	35.00
	Shanan Power House, Joginder Nagar			
	MHP Stage-1			
	ASHP			
	UBDC Stage-1 & II			
	Micro Hydel Projects			
	Total : VI (R&M of PSPCL Hydel Projects)	37.42	30.00	35.00
	GRAND TOTAL FOR GENERATION	201.25	360.25	478.25

NOTE: The expenditure towards Generation as projected by PSPCL for the FY 2017-18 and FY 2018 - 19 are Rs. 650 Crores and Rs. 1500 Crores respectively.

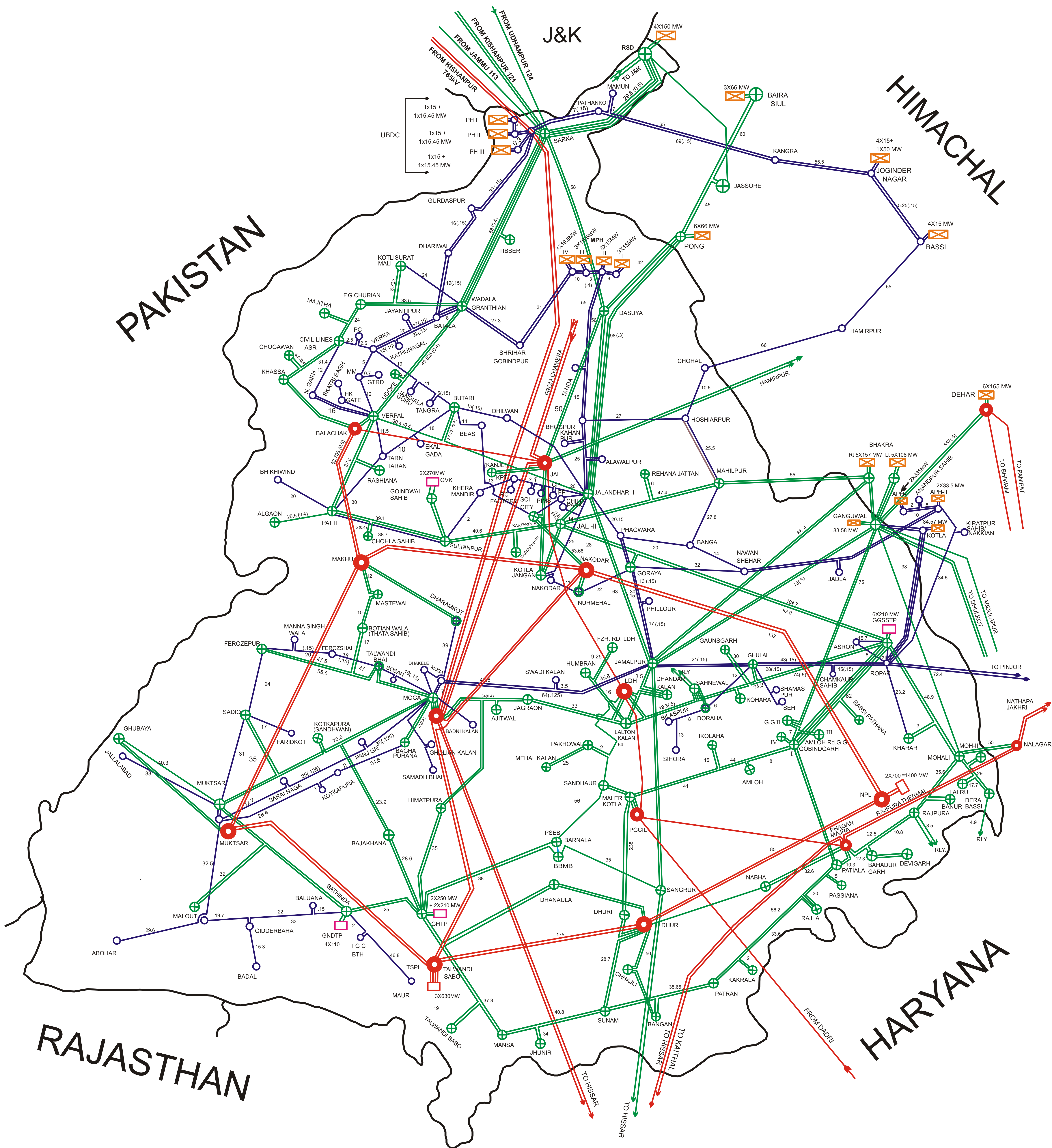




PUNJAB STATE TRANSMISSION CORPORATION LIMITED

TRANSMISSION MAP OF PUNJAB

132 KV & ABOVE AS ON 31-3-2015

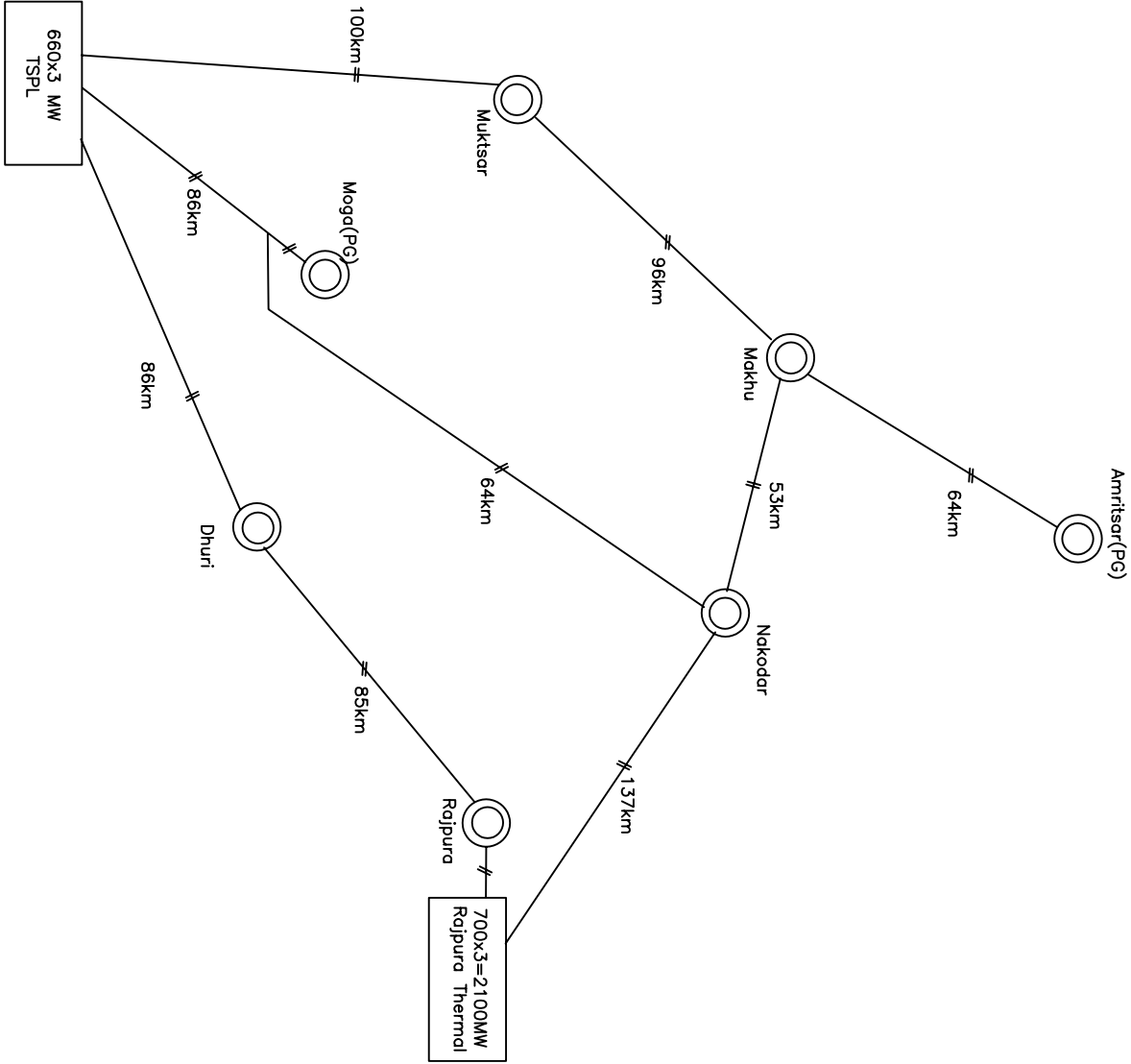


NOTE: LINE LENGTH ARE INDICATED IN KMS ALONG WITH LINES
CONDUCTOR SIZE OF ALL 220 KV LINES IS 0.4 SQ INCH
ACSR ZEBRA AND OF 132 KV LINES IS 0.2 SQ INCH
ACSR PANTHER UNLESS INDICATED OTHERWISE.

LEGEND				
Sr.No	Description	TransLines	GridSubStn	PowerHouses
1	132KV SC DC			Thermal
2	220KV SC DC			Hydro
3	400KV SC DC			

ISSUEDBYPLANNINGPSTCL

PUNJAB STATE TRANSMISSION CORPORATION LTD.
INTRA STATE 400KV GRID NETWORK WITH DISTANCE



400kV DC =
400kV Grid S/S