24X7 POWER FOR ALL

A JOINT INITIATIVE OF GOVERNMENT OF INDIA AND GOVERNMENT OF MIZORAM

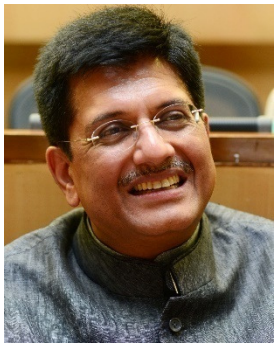
MAY 2016

सत्यमेव जयते

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

Mizoram's per capita electricity consumption is lower than national average, however this can be viewed as a state full of development opportunities. The state should make endeavours to bring the remaining unconnected households under electrification and should step up initiatives for wider and deeper implementation of DSM and renewable energy initiatives in the state. Nevertheless, state should also draw up plans to harness state generation potential as long term measure.

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

I compliment the Government of Mizoram and wish them all the best for implementation of this programme. The Government of India will complement the efforts of Government of Mizoram in bringing uninterrupted quality power to each household, industries, commercial business, public needs, small & medium enterprises & any other public needs and adequate power to agriculture as per the state policy.

Government of Mizoram

Government of Mizoram

Lal Thanhawla

Chief Minister of Mizoram

Foreword

Power sector is most critical component of state's growth driving mechanism and thus has a direct influence on state's economic well being. 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.

Mizoram is one of the North-Eastern Indian states offering opportunities for high growth and rapid development. State is committed to bring all the remaining un-electrified households within electrification and ensure 24x7 reliable and affordable power enabling the people to reap the benefits of growth and development with rest of the country.

The state's own generation also has to be augmented to avoid costly import of power considering the increasing generation cost and Point-of-Connection charges. Availability of economical power at consumers' doorstep will certainly bring about economic boost to the state.

Mizoram is covered with dense forests and the distribution system has to run through them creating innumerable breakdown to the weak and old distribution system. Apart from the transmission schemes, strengthening of weak distribution system should be one important step to provide uninterrupted power to the villages. Provision of power to the population residing in river valleys for agricultural purposes is also necessary for success of Power for All policy.

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 the Power sector.

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

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Government of Mizoram

Government of Mizoram

Joint Statement

The State of Mizoram 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 Mizoram (GoM) with the objective to connect the unconnected in phased manner by FY 2018-19 to ensure supply of quality, reliable and affordable power to all category of consumers on 24x7x365 basis.

Government of Mizoram 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, 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 Mizoram 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 Mizoram would endeavor 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)

16/6

16/06/2016

Rajiv Kumar Gupta, IFS
Commissioner & Secretary
Power & Electricity Department
Government of Mizoram(GoM)

CONTENTS

ANNEXURES

EXECUTIVE SUMMARY

24x7 Power for All (24x7 PFA) is a Joint Initiative of Government of India (GoI) and State Governments with the objective to make 24x7 power available to all households, industry, commercial businesses, public needs, Agriculture & any other electricity consuming entity by FY 2018-19 as per the State policy.

This roadmap document aims to meet the above objectives for the state of Mizoram. Mizoram stands at 30th position with approximately 0.06% of total installed capacity in the country. Mizoram is yet to achieve 100% electrification and 22007 households are un-electrified in the state (Both rural & urban) as of year 2015. The per capita consumption of power in Mizoram has been 449 Units which is much lower than the National Average of 1010 during FY 2014-15.

GROWTH IN DEMAND

Mizoram has observed peak power shortages between 18-24% and energy shortage in the range of 0.97% to 6.15% respectively during last 3-4 years. In order to achieve the objective of 24 x 7 power supply to all, it has been estimated to see an increase in peak demand from 89.74 MW (FY 2014-15) to 132 MW in FY 2018-19 with corresponding increase in energy requirement from 542.92 MU in FY 2014-15 to 692.98 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. Considering combined growth rate based on five (5) years CAGR (from FY 2008-09 to FY 2013-14) and the future growth potential of industrial & commercial activity, average CAGR of 11% per annum has been adopted to project the 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 120.15 MW. In order to meet the estimated increased demand for providing 24x7 power supply, the state has already planned additional capacity availability of 132.70 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, 65.50 MW shall be added through non-conventional energy sources (Solar& SHP) and balance 67.20 MW through conventional sources. As such the total available capacity by FY2018 -19 is expected to be 252.85 MW (170.30 MW– conventional and 82.55 MW – Non Conventional).

It is to be noted that after consideration of 24x7-PFA requirement, the state will have a surplus of about 11.62% to 27.54% in terms of Peak demand during the period from FY 2016-17 to FY 2018-19. However, during FY 2015-16 the state will face deficit in peak demand to the tune of 10.93%. In terms of availability of energy, the state will face deficit in the range of 4.67% to 13.83% in the FY 2015-16 to FY 2016-17. But for FY 2017-18 to FY 2018-19 it will become energy surplus in the range of 3.78% to 9.76%.

As the State generation capacity is heavily dependent on hydro sources (about 37% to 44% during the study period), the above surplus/deficit energy scenario may change on year to year basis depending upon monsoon scenario in the state. In poor monsoon years, the deficit of energy is expected to be more due to less generation from hydro power projects. On the other hand, in the years of above-average / good monsoon scenario, the contribution of hydro power projects is expected to be higher resulting in improvement in the scenario.

As deliberated above, the State of Mizoram will be expected to become an energy surplus state at the end of the study period. Government of Mizoram would have to effectively plan through comprehensive power procurement initiatives on short term, medium term basis to meet the energy requirement of the state for FY 2015-16 to FY 2016-17.It is required to firm up plan for banking of energy with other states having different seasonal load pattern to meet the peak demand.

The peak power & energy requirement of the UT may also be effectively reduced through proper implementation of DSM & energy efficiency measures in the UT.

ADEQUACY OF TRANSMISSION NETWORK

The state is served by a network of Inter- state transmission lines at 132 kV level. The existing ISTS transmission system capacity is adequate for meeting the present power requirement.

In ISTS system, Power-grid/State has undertaken/ planned a number of transmission line works for further strengthening the connectivity of Mizoram state grid with national grid and it shall be adequate to meet the projected power demand of Mizoram by FY 2018-19 for 24x7 PFA in the state.

The existing Intra-state transmission capacity at 132 kV level is 184.3 MVA to cater the current maximum demand 89.74 MW of the state. As per the state's transmission plan, the Intra-state transmission capacity will be increased to 371.5 MVA at 132 kV level FY 2018-19 which will be adequate to meet the projected Power demand of 132.00 MW of the state by FY 2018-19.

The Intra-state transmission system has been planned with an investment of Rs 633.89 Crores from FY 2014-15 to FY 2018-19 towards capacity addition in the state to meet the requirement as envisaged for 24x7 PFA.

ADEQUACY OF DISTRIBUTION NETWORK

As per the information, Power & Electricity Department is serving about 2.03 Lakhs consumers including 1.89 lakhs domestic consumers in the state. As per the survey undertaken by the state, still there are about 0.217 lakhs rural & 0.003 lakhs urban un-electrified households in the state which are proposed to be electrified during next three (3) financial years.

The state has undertaken & proposed a requirement of capital expenditure of Rs 30.28 Crores in DDUGJY-Village Electrification (against a NAD of Rs. 30.28 Cr.), 49.91 Crores in DDUGJY-System strengthening (against a NAD of Rs. 241.45Cr.), Rs. 49.16 Crores in IPDS (against a NAD of Rs. 330.00 Cr.), Rs. 240.42 Cr. in RAPDRP Part-B (against a NAD of Rs. 334.19 Cr.), Rs. 35.12 Cr. in RAPDRP Part-A (against a NAD of Rs. 42.85 Cr.), Rs. 73.37 Crores in REDB (against a NAD of Rs. 139.00 Cr.), Rs. 13.72 Cr. in NEC, Rs. 13.72 Cr. in NLCPR and Rs. 4.22 Cr. In SPA for feeder segregation, providing electricity access to all rural households, system strengthening & network up -gradation in rural & urban areas through a planned capacity addition of 103.40 MVA at 33/11 kV, 51.11 MVA at DT level and creation of 33 kV, 11kV ABC & Bare conductor lines, U/G cables, LT lines, Electronic consumer meters.

The proposed distribution network with projected addition through GOI/State schemes (DDUGJY, IPDS, REDB, NEC and RAPDRP) would remain adequate under projected peak load addition.

The AT&C losses of the state are projected to be reduced from 31.24 % in FY 2015-16 to 20.30 % by FY 2018-19 as per state data.

FINANCIAL POSITION

As the total power supply responsibility in the state is solely looked after by the Government department, no separate accounts are maintained. However based on tariff orders of FY 2015-16, the financial viability scenario has been worked out. It seems that across all the scenarios, losses are there and on average 6%-12% tariff hikes would be required for achieving turn around by FY 2018-19.

CHAPTER – 1: INTRODUCTION

Access to electricity on 24X7 opens the gateway to better life and widens opportunities. It means much more than merely an act of infrastructure development to any nation 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 stay 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) shall specify or 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 towards achieving this objective, Government of India and Government of Mizoram have taken a joint initiative to provide 24 X 7 power in the state to all consumers. This initiative aims at ensuring uninterrupted supply of quality power to existing consumers and providing access to electricity to all unconnected/upcoming consumers by FY 2018-19.

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

i. Ensuring 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/upcoming households to be provided access to electricity in a time bound manner ultimately by FY 2018-19. States have the liberty to hasten the process by taking accelerated steps, if required.

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. 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. 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 in this regard.

vii. Overall Power Supply Improvement to be achieved by undertaking measures such as energy mix optimization, reduction in power operational in-efficiency of state generation plant(s) and optimal fuel procurement policy.

viii. Financial measures including investment rollout plans and analysis to assess the financial impact from implementation of 24x7-PFA.

ix. Introduce modern technologies to monitor reliable supply like sub-station automation, providing adequate communication infrastructure, GIS, Reliability, Centralized 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 Mizoram aims to enhance the satisfaction level 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

Accordingly 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 years and also considering the aspirational growth perspectives in consultation with state.

2) Projection of demand of consumers encompassing commercial, industrial, agricultural and all remaining consumers have been carried out under others category based on past data and historical CAGR recorded for the state during the past years after discussing with state and factoring in the aspirational growth perspectives.

3) Assess the power requirement of un-electrified households and draw up a time bound plan for electrification of all households.

4) Project the annual energy requirement and maximum demand by aggregating the requirement of all consumer categories and applying an appropriate load factor.

5) Prepare a broad plan to meet power demand in future through additional generation capacity proposed in the state and quantum for additional procurement required.

6) Assess the financial implications on utilities 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 projected power requirement of all consumer categories of the state.

7) Conduct sensitivity analysis on various parameters namely tariff, AT&C loss reduction, etc.

8) 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 MIZORAM

Mizoram is the 24th largest state with an area of 21,081 km^2 and the 27th largest by population (as per census 2011) with total population of 1,097,206 (555,339 male and 541,867 female). The per capita income of the state in FY 2013-14 was Rs. 76,120 only. It is bordered by Myanmar (Burma) to its East & South, Bangladesh in the West, Tripura in North West, Assam in North and Manipur in North East. Mizoram has forest area of 16,717 km^2, which is about 79.30% of its geographical area.

The brief profile of Mizoram State of India is as follows:

Table-2.1

Brief Profile of Mizoram

Sl. No.	Description	Unit	
1.	Area	Sq. Km.	21081
2.	Population (Persons as per 2011 census)		
	- Rural	Nos.	525,435
	- Urban	Nos.	571,771
3.	Per Capita income (FY 2013-14)	Rs.	76,120 *
4.	No. of Districts	Nos.	08
5.	State GDP growth rate (FY 2013-14)	%	27.86 **
6	Total Urban Households (FY 2014-15)	Nos.	133850
7	Total Rural Households (FY 2014-15)	Nos.	117244
8	Total Electrified Urban Households (FY 2014-15)	Nos.	131028
9	Total Electrified Rural Households (FY 2014-15)	Nos.	96404
10	No. of un-electrified Households (FY 2014-15)	Nos.	22007

** Press Information Bureau, Ministry of Statistics and Programme Implementation.*
***Wikipedia*

The Power & Electricity Department, Mizoram (P&E D) is the sole Agency that is responsible for Generation, Transmission & Distribution of Power throughout the State. It is a power starved state despite having substantial Hydro Potential. It still depends on the power allocation from the Central public sector units (CPSUs) which barely meets certain percentage of demand during the lean season. At present the Deptt. is headed by Engineer-in-Chief. C.E. (system operation) P&E, C.E. (Dist.) P&E, Chief Electrical inspectorate, SLDC circle & project Circle-II, Aizawl report to the Engineer-in-chief. The Head office includes functions such as commercial, Account, Establishment, Transmission Planning, Generation Planning, Rural Electrification and design section. The individual Circles are looked after by Superintending Engineers.

Mizoram has shown peak power shortages in the range of 18% to 24% and energy shortage in the range of 1% to 6.15% during FY 2012-13 to FY 2014-15. It is yet to achieve 100% electrification and 22007 Households are un-electrified in the state (Both rural & urban) as of FY 2014-15, which are proposed to be electrified by FY 2018-19 in phased manner.

CHAPTER – 3: CONSUMPTION PATTERN AND ELECTRIFICATION STATUS

As per Census 2011 data, there were about 2.21 lakhs households in the state, out of which 1.05 lakhs were in rural areas and balance 1.16 lakhs were in urban areas. Out of 1.05 lakhs rural households, 0.72 lakhs (68.57%) were electrified and balance 0.33 lakhs (31.43 %) were un-electrified. In urban areas, out of total of 1.16 lakhs households, 1.14 lakhs (98.28 %) were electrified and balance 0.02 lakhs (1.72 %) were un-electrified. Mizoram is still striving to achieve 100% electrification status. The details are at Annexure-II.

The projection of total number of households in FY 2014-15 has been carried out based on census figures of 2011 and considering CAGR of the past 10 years. However, the data for total number of electrified households in urban and rural areas in FY 2014-15 is also compared with state data. Finally the latest available data from state has been considered for projecting the future household consumption.

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

Table-3.1

Nos. of Households in Mizoram in FY 2014-15

Particulars	Census 2001	Census 2011	CAGR	As projected from Census figures	As per State	Finally Adopted
Total Households	160966	221077	3.22%	251094	249439	249439
Rural Households	79362	104874	2.83%	117244	118132	118132
Urban Households	81604	116203	3.60%	133850	131307	131307
Total Electrified Households	112079	186155	5.20%	229674	227432	227432
Rural Electrified H/H	35028	72138	7.49%	96308	96404	96404
Urban Electrified H/H	77051	114017	4.00%	133366	131028	131028
Total Un-electrified H/H	48887	34922	-	21420	22007	22007
Rural Un-electrified H/H	44334	32736	-	20936	21728	21728
Urban Un-electrified H/H	4553	2186	-	484	279	279

Presently, there are about 2.27 lakhs electrified households in the state (Rural 0.96 lakhs and Urban 1.31 lakhs). Thus there are total of around 0.217 lakhs un-electrified households in rural area and around 0.003 lakhs un-electrified households in urban area. At present, out of the total consumption in the state, domestic category of consumers consume about 67%, commercial around 10%, industrial around 3 % and Public water works & Public lighting consume around 20%.

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 consumption has been assessed as 1.29 units/day in rural area and 3.61 units/day in urban area as shown in Table 3.2.

Table-3.2

ESTIMATION OF EXISTING PER HOUSEHOLD CONSUMPTION FOR FY 2014-15

Sl. No.	Particulars	Unit	As per State data (FY 2014-2015)
1	Total Households in State	Nos.	249439
2	Total Urban Households	Nos.	131307
3	Total Rural Households	Nos.	118132
4	Total Electrified Households	Nos.	227432
5	Total Electrified Households - Urban	Nos	131028
6	Total Electrified Households - Rural	Nos	96404
7	Balance Un-electrified Households	Nos.	22007
8	Balance Un-electrified Households - Urban	Nos.	279
9	Balance Un-electrified Households - Rural	Nos.	21728
10	Electrification of houses under 12th Plan RGGVY	Nos.	26210
11	Annual energy sold in the State during FY 2014-15	MU	327.21
12	Annual Domestic energy sold in the state during FY 2014-15	%	66.67
13	Annual Domestic energy sold in the State during FY 2014-15	MU	218.16
14	Average Annual Energy Consumption per household during FY 2014-15	kWh	959.23
15	Average Daily Energy Consumption per household during FY2014-15	kWh	2.63
16	Annual Total Rural Consumption	MU	45.53
17	Annual per household rural consumption	kWh	472.28
18	Annual Total Urban Consumption	MU	172.63
19	Annual per Household Urban Consumption	kWh	1317.50
20	Daily per household rural consumption	kWh	1.29
21	Daily per household Urban consumption	kWh	3.61

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

From the state provided historical data, it can be observed that peak deficit and energy deficits have been present throughout the past period and also have been range bound as 25% in terms of peaking shortage and 1% to 6.15% in terms of energy during last three years period. The Power Supply Scenario in Mizoram (as per state data) from the FY 2009-10 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	85.00	90.00	95.00	100.00	105.00	110.00
Peak Met at state periphery	MW	62.98	64.92	74.47	75.54	86.83	89.74
Peak Deficit (-)/ Surplus (+)	MW	(-)22.02	(-)25.08	(-)20.54	(-)24.46	(-)18.17	(-)20.26
Peak Deficit (-)/ Surplus (+)	%	**(-)25.91**	**(-) 27.87**	**(-) 21.62**	**(-)24.46**	**(-)17.30**	**(-)18.42**
Energy Requirement at state periphery	MU	348.04	465.70	493.83	494.67	510.65	542.92
Energy Availability at state periphery	MU	326.61	437.03	463.43	464.22	479.21	537.67
Energy Deficit (-)/ Surplus (+)	MU	(-)21.43	(-)28.67	(-)30.40	(-)30.45	(-)31.44	(-)5.25
Energy Deficit (-)/ Surplus (+)	%	**(-)6.15**	**(-)6.15**	**(-)6.15**	**(-)6.15**	**(-)6.15**	**(-)0.97**

Source: State Power Utilities

The reasons for deficit have been continued poor internal/ own generation and Transmission/Distribution constraints.

The base year for the purpose of beginning the future assessment has been considered as FY 2014-15 which has an aggregated demand of 542.92 Million Unit (MU).

Demand Estimation Methodology

For the purpose of 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:

a) Demand growth to a targeted value of already electrified households (both Urban and Rural).

b) Demand growth from electrification of un-electrified households (both Urban and rural).

c) Demand from electrification of newly constructed households (both Urban and Rural).

d) Demand on account of consumers other than domestic consumers including agricultural consumers, if any.

Considering the expected growth of electrification in the state in the coming years, all the un-electrified households have been considered to be brought under electrification over the consecutive four years from FY 2015-16 to FY 2018-19.

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

- Based on the urban & rural consumption data provided by state, present (FY 2014-15) per household consumption has been assessed as 1.29 units/day in rural area and 3.61 units/day in urban area.
- Energy requirement for rural & urban households have been computed based on the latent demand growth observed in past and a recent picture which is emanating out from consumption figure of the capital city of Aizawl. For the month of Dec'2015 the consumption was 16.177 MU for 75429 Nos. of households resulting in a per day per household consumption figure of 7.15 Units.

It was also found that Aizawl consumes nearly 47% of the total power of the state. Further, currently Power is being supplied to urban areas on an average of 22 hrs. /day and 20 hrs. /day to rural areas. Upon access to 24 hrs. of quality power supply, it is expected that the energy consumption/HH will grow manifold. Hence the CAGR adopted for growth of household consumption on an average of 10% is found to be realistic. The daily per household rural consumption is therefore estimated to increase from the current levels of 1.29 units/day to 1.89 units/ day by FY 2018-19 and daily per household urban consumption is estimated to increase from the current levels of 3.61 units/day to 5.28 units /day by FY 2018-19.

- Demand projections for consumers other than domestic have been done based on computation of CAGR from FY 2012-13 to FY 2014-15 as per data obtained from JERC Tariff order 2014-15 and State Data. Uniform growth @ 11% p.a in energy requirement for other than domestic category has been taken keeping in view the growth potential in industrial and commercial activities due to assured power availability.

PROJECTIONS OF ANNUAL ENERGY REQUIREMENT OF THE STATE

The annual energy requirement at state periphery works out to be around 520.97 MU in FY 2015-16 which is scaling up to around 692.98 MU in FY 2018-19 after considering the following.

a) Demand of already electrified households

The additional annual energy consumption for existing households works out to be 101.25 MU in FY 2018-19.

b) Demand from electrification of un-electrified households

According to the state data there are around 22007 un-electrified households (Rural – 21728 & Urban – 279). 6000 nos. (28%) of Rural unelectrified HH's have been electrified in FY 2015-16 whereas the assumed rate of electrification shall be at the rate of 64% for FY 2016-17 & 08% for FY 2017-18. The left over Urhan unelectrified HH's have already been electrified in FY 2015-16. The annual energy requirement on account of un-electrified households after electrification is estimated as 15.56 MU in FY 2018-19.

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 have been done considering CAGR of 3.60% (census of 2001 & 2011) on number of urban households and CAGR of 2.83% in number of rural households based on census data. The projected energy consumption of this category works out to 48.10 MU in FY 2018-19.

Demand on account of consumers other than domestic consumers.

The annual energy requirement for consumers other than domestic has been considered after discussion with state officers assuming that such segment of consumers are expected to grow at a constant CAGR of 11.00% per annum. Accordingly the energy consumption of other than domestic consumers works out to be 165.56 MU in FY 2018-19. The summary of 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	239.97	263.97	290.37	319.41
2	Annual Energy Requirement for Electrification of un-electrified Household	3.52	11.87	14.15	15.56
3	Annual Energy Requirement for newly constructed Household	8.58	19.20	32.24	48.10
	TOTAL DOMESTIC	**252.07**	**295.04**	**336.76**	**383.07**
4	Total Annual Energy Requirement including additional energy requirement - Other than Domestic Consumers (with 11.00% growth per annum)	121.05	134.37	149.15	165.56
	GRAND TOTAL	**373.12**	**429.41**	**485.91**	**548.63**

Annual energy requirement at state periphery

The table below shows values of projected energy requirement at the state periphery considering T&D loss trajectory as informed by state for the FY 2015-16 to FY 2018-19.

Table-4.3

ANNUAL ENERGY & PEAK DEMAND REQUIREMENT AT STATE PERIPHERY					
PARTICULARS	**Unit**	**FY 2015-16**	**FY 2016-17**	**FY 2017-18**	**FY 2018-19**
Energy requirement as per demand projections	MU	373.12	429.41	485.91	548.63
Distribution Loss	%	26.16	23.84	21.83	18.38
Intrastate Transmission Loss	%	3.00	3.00	3.00	3.00
Energy requirement at state periphery	MU	520.97	581.23	640.87	692.98
Load Factor (LF)	%	52.47	56.12	59.42	60.09
Peak Demand	MW	**113.00**	**118.00**	**123.00**	**132.00**

**As per T&D loss trajectory provided by the State*

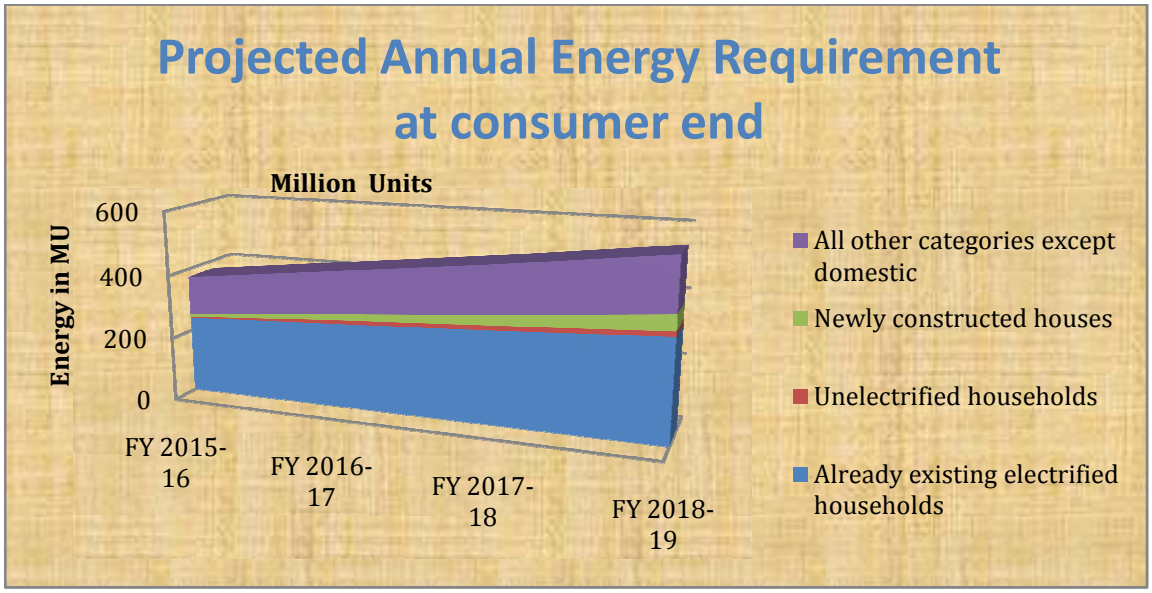
The load factor for FY 2015-16 has been derived from actual data as per CEA for Mizoram from the period April 2015 to Feb. 2016. The Load factors for the rest of future years have been considered based on the data furnished by Power & Electricity department, GoM.

The detailed calculation of energy demand under different categories in the state up to FY 2018-19 is given in Annexure-III.

Keeping in view the unrestricted demand, the energy requirement at consumers end is estimated as 548.63 MU which corresponds to 692.98 MU at state periphery (considering Transmission & Distribution loss trajectory as informed by state) for all categories of consumers by FY 2018-19.

Accordingly the maximum demand requirement of the state is projected to increase to around 132.00 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 Mizoram would be 1111.84 MU and 313.70 MW respectively in FY 2018-19 as against the now calculated energy demand of 692.98 MUs (37.67 % lower) and peak load of 132.00 MW (57.92 % lower) in FY 2018- 19.



As against energy demand of 692.98 MU in FY 2018-19 at the state periphery, the energy availability projections from all possible sources as per Generation Plan by FY 2018-19 works out to 767.96 MU (shown in next chapter) indicating a surplus of 74.98 MU.

The adoption of various energy efficiency measures like energy efficient lighting (use of LEDs), adopting demand side management initiatives like DELP -DSM based efficient lighting measures or by adopting accelerated AT &C loss reduction targets would help in reducing the peak demand and energy requirement of the state.

However, an assessment of the adequacy of Generation, Transmission and Distribution infrastructure vis-a-vis the projected demand by FY 2018-19 has been made in the subsequent chapters.

CHAPTER – 5: GENERATION PLAN

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:

a. Existing Generation
b. Future Generation Plans (Projects under construction and future projects)
c. Year-wise capacity addition plan from renewable source (separately for Solar, and Small Hydro Power (SHP) etc.)
d. Generation capacity required to meet Peak Demand
e. Action plan of the state
f. Fund Requirements
g. GoI/ 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 Mizoram is 120.15 MW. Out of total 120.15MW, about 4.00% is from Coal based thermal, 44.33 % is from gas based thermal, 37.47 % is from Hydro and balance 14.19% is from Renewable Energy Sources.

In terms of ownership, the Central Sector allocation has the largest share of 85.81 %, followed by share of State Sector which is 14.19%. The details of existing generating capacity available for the state of Mizoram are shown in Table-5.1 below:

Table 5.1

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

Ownership/ Sector	Mode-wise Breakup (MW)							
	Thermal				Nuclear	Hydro	RES	Grand Total (MW)
	Coal	Gas	Diesel	Total				
State	0.00	0.00	0.00	0.50	0.00	0.00	17.05	17.05
Private/ IPPs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central	4.82	53.26	0.00	58.08	0.00	45.02	0.00	103.10
Total	**4.82**	**53.26**	**0.00**	**58.08**	**0.00**	**45.02**	**17.05**	**120.15**

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

As per generation plan of State of Mizoram, capacity of around 132.70 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 which, 65.50 MW shall be added through non-conventional energy sources and balance 67.20 MW through conventional sources. As such the total available capacity by FY2018 -19 is expected to be 252.85 MW (170.30 MW– conventional and 82.55 MW – Non Conventional).

Year wise Summary of Generation Capacity / availability of Power, upto FY 2018-19 is indicated in Table-5.2 below:

Table 5.2

Year wise Existing & Likely Capacity to be added (MW)-Cumulative

Sl. No.	Particulars	Year wise Existing & Likely Capacity to be added (MW)-Cumulative				
		As on March 2015	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
A.	**State Sector**					
a.	Thermal	0.00	0.00	0.00	0.00	0.00
b.	Hydro	0.00	0.00	0.00	0.00	0.00
c.	RES (MNRE)	17.05	17.05	34.05	55.55	82.55

Sl. No.	Particulars	Year wise Existing & Likely Capacity to be added (MW)- Cumulative				
		As on March 2015	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
B.	**Private/IPPs**					
a.	Thermal	0.00	0.00	0.00	0.00	0.00
b.	Hydro	0.00	0.00	0.00	0.00	0.00
c.	RES (MNRE)	0.00	0.00	0.00	0.00	0.00
C.	**Central Generating Station**					
a.	Thermal	58.08	58.08	59.28	59.28	59.28
b.	Hydro	45.02	45.02	71.02	91.02	111.02
c.	RES (MNRE)	0.00	0.00	0.00	0.00	0.00
	Total	**120.15**	**120.15**	**164.35**	**205.85**	**252.85**

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

Future Projects

Government of Mizoram (GoM) has proposed implementation of SHP and Hydro Electric Projects (likely to be commissioned by FY 2018–19) to meet the future power requirement of the state as shown in the table-5.3 below:

Table 5.3

Sl. No.	Generating Station	Share of the State	Expected COD
1	Tuirini(HEP)	25.00	01/Apr/18
2	Iva(SHP)	3.00	01/Apr/18
3	Ngengrual(SHP)	1.00	01/Apr/18

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 plant as per National Electricity Plan (Vol-I) for 12th five year Plan. State peak power requirement is coming around 6 pm, so solar power is not considered in the calculation of availability of peak power. Energy availability has been worked-out considering the actual PLF of State generating station, as intimated by the State. For central hydro power plants, energy availability has been worked out by the PLF indicated by CEA. The availability of peaking capacity and energy availability have been worked out up to FY 2018-19 and shown in Table-5.4 below:

Table 5.4

Peaking and Energy Availability up to FY 2018-19

Sl. No.	Particulars		FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
1	Total Capacity (MW)		120.15	164.35	205.85	252.85
2	Estimated Peak Availability at State Periphery (MW)		101.87	133.52	158.72	182.18
3	Estimated Energy Availability at State Periphery (MU)	Energy from all sources (MU)	457.66	555.29	666.03	767.96
		Energy from renewable sources (included above)	46.67	82.78	122.68	172.42

Based on the deliberation in the previous text, the scenario in the state emerges as shown in the Table-5.5a below:

It could be seen from Table-5.5a that the peak demand of Mizoram would be about 132.00 MW by FY 2018-19 considering the additional power requirement for providing 24x7 power supply to all in the state. The expected energy requirement at state periphery for FY 2015–16 is about 520.97 MU which is likely to increase to 692.98 MU by FY 2018-19. It is also observed from Table-5.5a that the state will have a surplus of about 11.62% to 27.54% in terms of Peak demand during the period from FY 2016-17 to FY 2018-19. However during FY 2015-16 the state will face deficit in peak demand to the tune of 10.93%. In terms of availability of energy, the state will become energy surplus i.e. 3.78 % to 9.76% for the FY 2017-18 and FY 2018-19 respectively.

Table-5.5a

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 at state periphery	MW	113.00	118.00	123.00	132.00
2	Estimated Availability of Peak/ Maximum Demand at state periphery as per State Generation Plan	MW	101.87	133.52	158.72	182.18
3	Peak Surplus (+)/Deficit(-)	MW	(-)11.13	(+)15.52	(+)35.72	(+)50.18
4	Surplus(+)/Deficit(-)	%	(-)10.93%	(+)11.62%	(+)22.50%	(+)27.54%
5	Estimated Energy Requirement at State Periphery	MU	520.97	581.23	640.87	692.98
6	Estimated Energy Availability at State Periphery as per State Generation Plan	MU	457.66	555.29	666.03	767.96
7	Energy Surplus (+)/ Deficit(-)	MU	(-)63.31	(-)25.94	(+)25.16	(+)74.98
8	Energy Surplus (+)/ Deficit(-)	%	(-)13.83%	(-)4.67%	(+)3.78%	(+)9.76%

As the state generation is heavily dependent on hydro (about 37 % to 44 % during the study period), the above energy deficit scenario may change slightly on year to year basis depending upon monsoon scenario in the state.

In poor monsoon years, the availability of surplus energy is expected to be less due to less generation from hydro power projects. On the other hand, in the years of above-average / good monsoon scenario, the contribution of hydro power projects is expected to be higher resulting in increase in availability of surplus energy.

As deliberated above, the State of Mizoram will be expected to become an energy surplus state at the end of the study period. Government of Mizoram would have to effectively plan through comprehensive power procurement initiatives on short term, medium term basis to meet the energy requirement of the state for FY 2015-16 & FY 2016-17. It is required to firm up plan for banking of energy with other states having different seasonal load pattern to meet the peak demand.

The peak power & energy requirement of the UT may also be effectively reduced through proper implementation of DSM & energy efficiency measures in the UT.

The generation mix as per the proposed generation plan of the state is shown in Table-5.5b.

Table -5.5b

Generation Mix

Sl. No.	Description	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
a.	Thermal	48.34%	48.34%	36.07%	28.80%	23.44%
b.	Hydro	37.47%	37.47%	43.21%	44.22%	43.91%
c.	RES (MNRE)	14.19%	14.19%	20.72%	26.99%	32.65%

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 given in Table- 5.6:

Table -5.6

Sl. No.	Power For All (Roll Out Plan)	Year wise Addition (MW)				Total (MW)
		FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
A.	**State Sector**					
a.	Thermal	0.00	0.00	0.00	0.00	0.00
b.	Hydro (Renewable)	0.00	0.00	0.00	0.00	0.00
c.	RES (MNRE)	0.00	17.00	21.50	27.00	65.50
B.	**Private/IPPs**					
a.	Thermal	0.00	0.00	0.00	0.00	0.00
b.	Hydro (Renewable)	0.00	0.00	0.00	0.00	0.00
c.	RES (MNRE)	0.00	0.00	0.00	0.00	0.00
C.	**Central Generating Station**					
a.	Thermal	0.00	1.20	0.00	0.00	1.20
b.	Hydro (Renewable)	0.00	26.00	20.00	20.00	66.00
c.	RES (MNRE)	0.00	0.00	0.00	0.00	0.00
	Total	**0.00**	**44.20**	**41.50**	**47.00**	**132.70**

The state is required:

- To firm up plan to reduce the peak demand and energy demand through demand side management and by adopting energy efficiency measures.
- As a medium term measure, to procure cheaper power under case-I route from the market to meet the demand for providing 24x7 power in the state.
- To take up the matter of fund requirement with GOI for execution of hydro projects to be developed by the state so that no viable identified resourcewithin the state remain untapped.

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 or allocation from Central Generating Station keeping into consideration variation in availability & requirement of energy from various sources across the year.

Government of India (GOI) Intervention Required:

- Ministry of New and Renewable(MNRE) is requested for fast clearance of subsidy for

the development of the new small hydro projects to meet the projected demand of the state.

- Ministry of Environment & Forest (MOE&F) is requested for fast clearance of Tuirini (25 MW) and Tut(24 MW) projects. Tuirini project is likely to achieve COD within FY 2018-19 whereas expected COD for Tut project is beyond FY 2018-19.
- GoI is requested for sanctioning funds for the upcoming state sector projects, So that state dependency on the Central sector projects gets reduced.

Fund Requirement

The details of estimated fund requirement of the state sector projects are given in the Table- 5.7 below:

Table -5.7

For State Sector/JV Projects

(Rs. in Cr.)

S. No.	TYPE	Total Cost of Project (STATE SECTOR)	Expenditure up to March 2015	Year wise Fund Requirement (Rupees in Crores)				Remarks
				FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
A.	**Projectsunder construction**							
a.	Tlawva	57.49	46.07	0.00	11.42	0.00	0.00	on going
b.	Kawlbem	49.60	16.00	0.00	20.00	13.60	0.00	on going
c.	Tuiriza	1.56	0.35	0.00	1.21	0.00	0.00	on going
d.	Tuiching	2.20	0.76	0.00	1.44	0.00	0.00	on going
	Total (U/C)	**110.85**	**63.19**	**0.00**	**34.06**	**13.60**	**0.00**	
B.	**Projects under R&M**							
	Hydel							
a.	Tuirivang	1.72	0.75	0.00	0.97	0.00	0.00	on going
b.	Tuipanglui	3.00	0.00	0.00	2.00	1.00	0.00	Posted to MNRE on 13th March 2015
c.	MaichamPh-I	4.08	0.00	0.00	3.08	1.00	0.00	
d.	Teirei	3.24	0.00	0.00	0.00	2.24	1.00	Posted to MNRE on 3rd Feb 2011.
	Total (R&M):	**12.03**	**0.75**	**0.00**	**6.05**	**4.24**	**1.00**	
C.	**Future Projects**							
a.	Tuirini	474.62	0.00	94.924	142.386	142.386	94.9	
b.	Iva	40.26	0.00	8.05	16.104	16.104	0.00	2012 Price Level
c.	Ngengrual	25.97	0.00	5.1934	10.3868	10.3868	0.00	2009 Price Level
	Total (Hydel):	**540.85**	**0.00**	**108.17**	**168.88**	**168.88**	**94.92**	
D.	**RES**							
a.	DDG Scheme Phase-I	DPR for 10 project consisting of 52 villages is bieng prepared as per DDG giudelines.		0.00	31.75	31.75	0.00	DPR under preparation
b.	DDG Scheme Phase-II	DPR for 40 project as recommended by GOI is in preparation stage.		0.00	63.50	127.00	63.50	DPR under preparation
	Total (RES):	**317.50**	**0.00**	**0.00**	**95.25**	**158.75**	**63.50**	
	Grand Total:	**981.23**	**63.94**	**108.17**	**304.24**	**345.46**	**159.42**	

CHAPTER – 6: TRANSMISSION PLAN

The present peak power demand and energy requirement for the State of Mizoram is of the order of 110 MW and 542.92 MU (for FY 2014-15). The Power demand in the coming years would increase significantly due to various factors i.e. increase in demand of existing consumers due to increased uses of various appliances, commercial activities and industrialization etc. in the State. Considering all the above factors into account and with an objective to provide 24x7 power supply to all, the expected power demand of Mizoram by FY 2018-19 would be in the order of 132.00 MW with annual energy consumption of 692.98 MU. To meet this growing demand, a robust and reliable Inter-State & Intra-State transmission network is required. For this, existing transmission system would be strengthened both at Inter State level as well as Intra State level with proper planning to cater the demand in a reliable manner considering 24X7 Power for All.

Inter State Transmission System (ISTS)

Presently about 489 ckt km of 132 kV EHV transmission line and 01 nos. of 132 kV Switching Sub-station are existing in Mizoram under Inter-State Transmission system.

The existing Inter-State Transmission facilitates feeding power to the state via 1 No. 132 kV Switching Substation located at Aizawl. The Switching station at Aizawl is fed from three PGCIL Substations namely, Kumarghat (Tripura), Jiribum (Manipur) & Badarpur (Assam) via Kolasib (Mizoram).

In order to facilitate the drawl of power by Mizoram and to meet the projected peak load of 132.00 MW by FY 2018-19, some modifications to Inter-State transmission system (ISTS) has been planned.

The various ongoing ISTS projects are outlined below. :

On-going /Under planning ISTS projects:

New Substation & Augmentation works (Owned by State)

- One no. 25 MVA 132/33 kV Substation at Melriat.
- One No. 25 MVA 132/33 kV Substation at Sihhmui.
- Augmentation of Kolasib 132/33 kV substation with capacity addition of 25 MVA.

New Transmission lines

- Silchar to Melriat 400 kV D/C 286 CKm Transmission Line at 132 kV level.
- Melriat (New) to Sihhmui 132 kV D/C 12 Km Transmission Line.
- LILO of One Ckt. of Aizawl – Zemabawk 132 kV D/C Line at Melriat – 30 CKm.

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

The present ISTS system for Mizoram transfers power to the state through a switching Station at Aizawl. The downstream Substations of Aizawl Switching Station (Zuangtui upper & Luangmual) and Kolasib are having an installed capacity of 112.5 MVA. In addition to the above, the upcoming substations at Sihhmui & at Melriat and capacity augmentation at Kolasib shall be taken into consideration for evacuation of power to the state in the coming years.

The net power to be evacuated from the above units at 132 kV level & below is 14.81 MW (16 MVA) in FY 2015-16, 40.45 MW (45 MVA) in FY 2016-17, 65.64 MW (73 MVA) in FY 2017-18 & 89.10 MW (99 MVA) in FY 2018-19. The projected power demand of Mizoram by FY 2018-19 shall be 132.00 MW (147 MVA). Considering drawl of about 89.10 MW (99 MVA) of power from the state generating units at 132 kV and below, balance power to be evacuated at 132 kV level shall be 42.90 MW (48 MVA) by FY 2018-19. We have considered 80% loading on transformers and overall diversity of 1.2, hence minimum transformation capacity required is 1.5 times the projected peak demand (MVA) i.e. 72 MVA (1.5 x 48 MVA)

The year wise generation addition, total available capacity vis-a-vis transmission system available at 132 kV level for Mizoram is tabulated as under:

Table-6.1

Year	Generation Within Mizoram – Intra state (MW)		Inter state (ISGS) – Generation for Mizoram (MW)		Total Available capacity (MW)	Peak Power Demand of Mizoram to be evacuated at 132kV level (Peak power demand - Power evacuated at 132 kV level and below.) (MW)	Minimum Transformation capacity required at 132 kV level (MVA)*	Transmission System existing/Planned at 132 kV level including PGCIL & P&E D (Interstate &Intrastate) 132 kV GRID S/S (MVA)
	Addition	Total	Addition	Total				
As on Nov. 2015	-	17.05		103.10	120.15			112.5
FY 2015-16	0.00	17.05	0.00	103.10	120.15	113.00 – 14.81 = 98.19	164.00	112.5
FY 2016-17	37.00	54.05	7.20	110.30	164.35	118.00 – 40.45 = 77.55	129.00	137.5
FY 2017-18	41.50	95.55	0.00	110.30	205.85	123.00 – 65.64 = 57.36	96.00	137.5
FY 2018-19	47.00	142.55	0.00	110.30	252.85	132.00 – 89.10 = 42.90	72.00	187.5

* ***Minimum Transformer capacity in MVA = Peak Power Demand at distribution level (in MW/0.9 x 1.5).***

As such it is evident from the above table; the existing and planned ISTS System is adequate to meet the projected peak demand of Mizoram by FY 2018-19.

Action Plan – CTU

- Ongoing schemes (New Substation & Transmission line) shall be implemented as per schedule by PGCIL route for ensuring the transmission system to achieve the target of 24 X 7.

- To achieve the target, expansion and augmentation of Transmission facility need to be done with sustainability. Due thrust may be given for proper implementation of ESPPF (Environmental & Social policy and Procedures Framework), which has been designed to identify, address and mitigate any adverse environmental & social issues during project implementation.

- Regarding establishment of New Sub-station at Lungsen with 132/33 kV, 2x12.5 MVA transformer, charging of Lunglei – Lungsen line at 132 kV level is required. For this, one 132 kV bay at Lungsen is required to be constructed.

- Regarding augmentation of Lunglei sub-station by 25MVA, 132/33kV transformer, one 132 kV bay at Lunglei is required to be constructed for charging of Lunglei – Lungsen line at 132 kV.

- Regarding establishment of New sub-station at W. Phaileng with 132/33 kV, 2x12.5 MVA transformer requires charging of Zemabawk – W. Phaileng line at 132 kV. For this, 132 kV bay at Zemabawk is required to be constructed by Govt. of Mizoram whereas 132 kV bays at Phaileng has to be constructed under NERPSIP scheme. Govt. of Mizoram needs to construct 132 kV bay at Zemabawk in matching time-frame.

Action Plan – GOI

The GOI has undertaken up a transformative change programme in the power sector so as to ensure affordable 24x7 power for all homes, industrial and commercial establishments and adequate power for all, in the next few years.

- Wherever necessary, clearances (Highway, forest clearance etc.) as required shall be expedited at the highest level for timely completion of the project.
- Adequate attention shall be paid to funding of all the schemes, so that capacity addition (MVA capacity as well as Transmission Lines) may be completed within the stipulated time period.

Intra State Transmission System:

The existing Intra state transmission capacity is as follows:

- 132/66 kV level = 12.5 MVA.
- 132/33 kV level = 184.3 MVA.

The ongoing strengthening program of existing Intra-State transmission system is under implementation up to FY 2018-19. After implementation of this plan, the existing transformation capacity at 132/33 kV level shall increase to 371.50 MVA.

The installed capacity pertaining to 132/66 kV shall remain unchanged.

Intra State Transmission System (Present):

The transmission network comprising of 10 substations (Nov. 2015) of various voltage levels presently caters to the load demand across the State.

- 4 Nos. of 132 kV grid substation at Zuangtui (Upper), Luangmual, Khawiva & Khawzawl having 125 MVA & 21.65 MVA installed capacity at 132/33 kV & 33/11 kV level respectively and 112.93 km of associated lines.
- 1 Nos. of 132 grid substations at Bawktlang having 25 MVA, 12.5 MVA and 6.3 MVA installed capacity at 132/33 kV, 132/66 kV and 66/11 kV level respectively and 30.30 ckm of associated lines.
- 4 Nos. of 132 kV grid substations at Bairabi, Bukpui, Keifangtlang and Saitual having 34.3 MVA installed capacity at 132/33 kV level and 189.6 ckm of associated lines.
- 1 No. of 132/11 kV grid substations at Bairabi Thermal with 30 MVA substation installed capacity.

Note: List of existing 132 kV substations and transmission lines is enclosed as Annexure-V.

Details of Ongoing / Planned Intra-State Transmission system.

New sub-stations / Transmission lines

- One No. 132/33 kV substation at New Zuangtui with 25 MVA capacity is planned for implementation during FY 2016-17 under State Plan.
- 4 Nos. of 132/33 kV substations at Lungsen, W.Phaileng, Marpara & E.Lungdar with 87.5 MVA capacity and 334 Ckm transmission lines are planned for implementation during FY 2018-19 under NERPSIP/NEC funding.

The year wise proposed plan of **New Sub-station and Transmission lines** are as follows:

Table-6.2

Project	Voltage Level	Unit	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
Intra-State Trans-mission Network	132/33 kV	No./MVA	-	1/25	-	4/87.5
		ckt. km.	-	59.09	-	559.00

Augmentation on existing sub-stations

- 4 Nos. of 132 kV Grid Substations at Lunglei, Serchhip, Saitual & Khawzawl are undergoing capacity augmentation with an addition of 75 MVA at 132/33 kV level.

The details of year wise ongoing/ planned Intra-State transmission system as enclosed as Annexure-VI.

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

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

Table- 6.3

Year	Peak power demand (MW)		Minimum Transformation capacity required (MVA) *	Transmission System existing/Planned at 132/33 kV (MVA)**	
	Addition	Total		Addition	Total
As on Oct 2015		89.74			184.3
FY 2015-16		113.00	188	0	184.3
FY 2016-17		118.00	197	25	209.3
FY 2017-18		123.00	205	0	209.3
FY 2018-19		132.00	220	162.5	371.5

*** Minimum Transformer capacity in MVA = Peak Power Demand at distribution level (in MW/0.9 x 1.5).**
**** Projected Transmission Capacity based on planning.**

As such, the existing Intra-state transmission system of Mizoram is adequate to meet the projected peak demand of Mizoram of 132.00 MW by FY 2018-19 both at 132 kV level as well as downstream level.

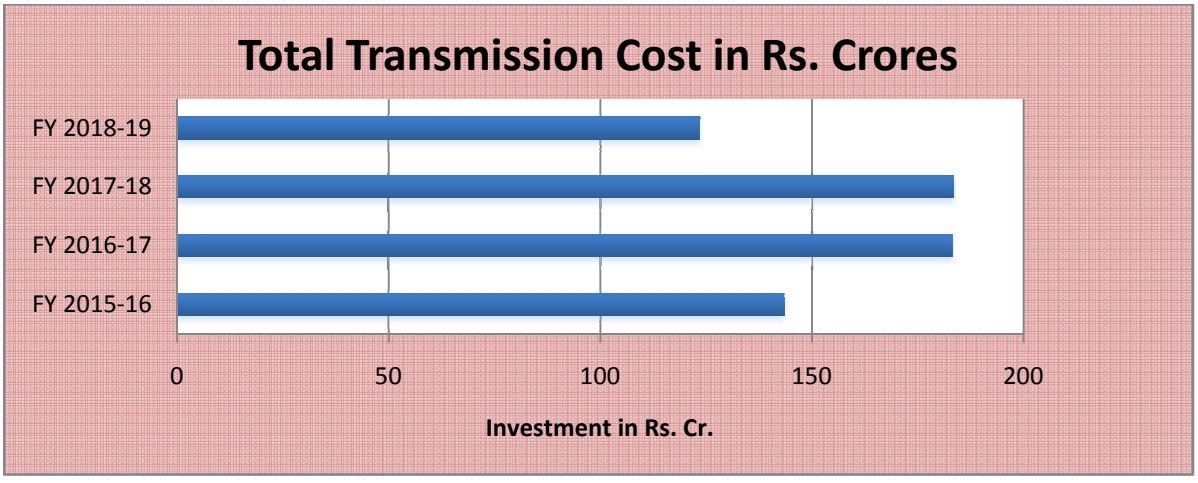
Year wise fund requirement for development of Planned Transmission system

Total estimated investment of about Rs. 633.89 Crores from FY 2015-16 to FY 2018-19 has been envisaged for intra State system under various funding.

(Details of year wise investment plan for transmission infrastructure for FY 2015-16 to FY 2018-19 is enclosed as **Annexure –VI.**

Year wise details of Physical targets and proposed investments

Details of tentative investment plan for FY 2015-16 to FY 2018-19 are as below:



Action Plan – P&E D (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.

State Government intervention

- The proposed transmission system up to FY 2018-19 needs to be implemented as per schedule for ensuring 24x7 power supply in the State.
- The State government shall expedite all necessary help (i.e. Right of Way clearance, Forest clearance if any, land acquisition etc) to STU for installation of new substation and associated transmission lines to provide 24x7 power to all in Mizoram.
- Investment of about Rs. 633.89 Crores from FY 2014-15 to FY 2018-19 has been envisaged for Intrastate transmission system. Financial tie up with financial institutions regarding fresh proposals for transmission infrastructure should be looked into for effective implementation.
- State needs to make adequate budgetary provision towards building transmission infrastructure.

Government of India intervention

- **Mitigation of Right of way constraints and availability of land:** GoI, MoP has issued guidelines on 05th October' 2015 on providing compensation for acquiring Right of way for Transmission Line.
- Upgrading of existing transmission lines with high capacity conductor to meet reliability criteria. It will involve high costs. Intervention at the level of Government of India needed.
- Adoption of the GIS technology at new substations specifically in the urban area having land scarcity and Government of India intervention for cost reduction of Gas Insulated Substation (GIS) technology is required.

Initiatives taken by the State on SCADA and OPGW

State Load Despatch Centre (SLDC) is not yet commissioned technically. A team of SLDC haeded by S.E is positioned at the heart of Aizawl city. Technical Setup for SLDC has started and is expected to be commissioned by middle of 2016. The SLDC will be furnished with Modern technologies for SCADA to improve reliability and reduction of Network downtime. As of now no real time data from Substations is known by SLDC and RTU's are not yet readable by SLDC. All instructions are given verbally and hence actual monitoring of Power flow is not achieved. The success of the order and instructions depends upon the field staff.

Existing Communication in the Department

The P&E Department, Mizoram is having OPGW line in Aizawl – Lunglei Transmission Line.

Upcoming Communication proposal / project of the Department:-

P&E Department proposes to have more OPGW lines in the future transmission projects.

CHAPTER – 7 : DISTRIBUTION PLAN

Distribution system of Mizoram State is being served by The Power & Electricity department (P&E D). The Department is serving about 2.03 lakhs of electricity consumers including about 0.12 lakhs under commercial category during FY 2014-15.

As per Government of Mizoram, as on 1st April 2015 there are about 2.49 lakhs households in the state (1.18 lakhs are in rural area and 1.31 lakhs are in urban area). Out of total 2.49 lakhs households, about 2.27 lakhs households are electrified (0.96 lakhs are in rural area and 1.31 lakhs are in urban area). There are still around 0.217 lakhs un-electrified households in the rural areas and 0.003 lakhs un-electrified households in the Urban area as on 1st April 2015.

As on Dec. 2015, daily electricity for about 20 hours on an average is being provided in the rural areas and 22 hours on an average is being provided in the Urban areas. The hours of supply depends on availability only.

The Billing & Collection efficiency for the state stands at 81.5% & 86% respectively for FY 2014-15. The DT failure rate for Mizoram is 5.0 % for FY 2014-15. The HT to LT ratio stands as 1.84: 1 for FY 2014-15. However the HT to LT ratio is less than 1 in main urban areas.

Existing Distribution system as on 15th December 2015

There are 67 Nos. of 33/11 kV Power Sub-Stations, 1623 Nos. of Distribution Transformers, 3729.83 ckt kms of low tension lines, 5747.79 ckt kms of 11 kV lines and 1119.40 ckt kms of 33 kV lines in the state of Mizoram. All the Feeders are metered properly at the substation end and DT metering has been done under R-APDRP.

The total installed capacity of 33/11 kV HT Power Transformers and Distribution Transformers (DTs) is 204.60 MVA and 200.52 MVA respectively. The details of distribution system as on December 2015 are indicated in Table-7.1 below:

Table-7.1

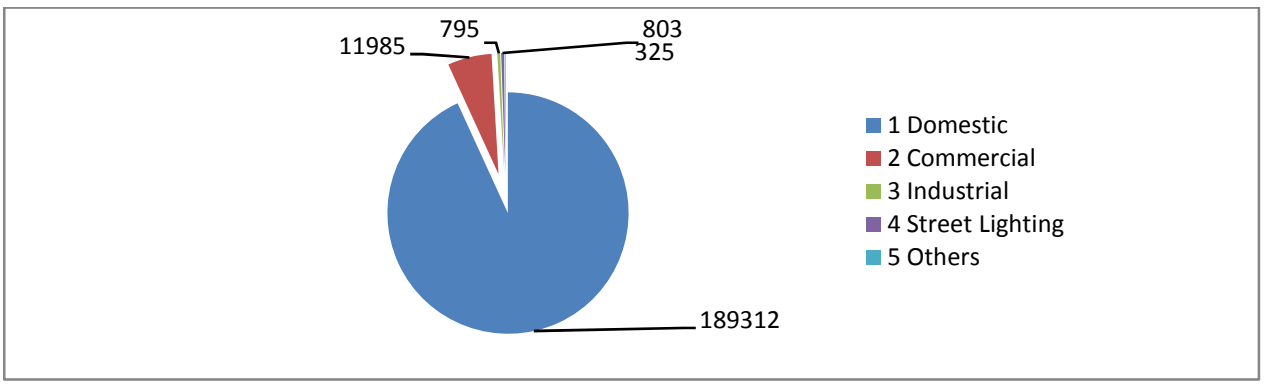
Distribution System Details of Power & Electricity Department (P&E D) as on 15.12.2015

Sl. No.	Description	Unit	P&E D
1.	Total Length of 33 kV line	Ckt kms	1119.40
2.	Total Numbers of 33/11kV Power Sub-stations	Nos	67
3	Total Capacity of 33/11kV Power Sub-stations	MVA	204.60
4.	Total Numbers of DTs	Nos	1623
5.	Total Capacity of DTs	MVA	200.52
6.	Total Length of 11 kV line	Ckt kms	5747.79
7.	Total Length of LT line	Ckt kms	3729.83

Source: P&E D, Mizoram

Category Wise Consumers

The number of consumers (category wise) as on 31.03.2015 is shown below:



Mizoram Consumer Profile for FY 2014-15 is shown below:

Table-7.2

Consumer Category	% Numbers	% Consumption
Domestic (DS)	93.16%	66.67%
Commercial	5.9%	10.40%
Industrial (Ind.)	0.39%	2.64%
PWW	0.02%	14.27%
Others	0.53%	6.02%

STATUS OF ON-GOING DISTRIBUTION SCHEMES IN THE STATE

RAPDRP

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

IT implementation agency was appointed for implementation of R-APDRP-A scheme in 9 towns of Mizoram including establishment of common Data center for NE states at Guwahati. Customer Care Centre is located at Aizawl and data recovery centre at Agartala, Tripura for all North Eastern States. The scope covered setting of IT infrastructure at DC & DR subdivision offices and other offices and integration of all the offices with data centre by providing suitable connectivity. Facility Management Services for 5 years after "Go-Live" of the projects have also been kept under scope of ITIA.

IT Implementation has been done in the following areas;

1. Metering, Billing & Collection processes.
2. New connection, disconnection, reconnection processes.
3. Generation of exception reports from the R-APDRP solution.
4. Generation of Energy Audit reports from the R-APDRP Solution.
5. GIS based consumer indexing and asset Mapping.

6. GIS based Integrated Network Analysis Module.
7. Centralized Customer care services.
8. Management Information System (Data Warehouse).
9. Asset Management and Maintenance Management.
10. Web Based Self Service Portal.
11. Identify and Assess Management System.
12. System Security requirement.
13. Development of Commercial Data Base of consumers.

Highlights of Part-A in the state of Mizoram are:

- The scheme was sanctioned in 2nd June 2010.
- The amount sanctioned by PFC is Rs. 35.12 Cr. for 09 towns against NAD of Rs. 42.85 Cr.
- Data Centre completed and commissioned at Guwahati.
- Disaster Recovery Centre to be commissioned at Tripura.
- Customer Care Center has been commissioned in Aizawl.
- 720 Nos. DT meters have been installed.
- Consumer indexing is completed in all 9 towns.
- Asset Mapping is completed in all towns.
- 1 no. of town has been declared "Go-Live".

Highlights of Part-B in the state of Mizoram are:

- The scheme was sanctioned in 27th Sept. 2013.
- The amount sanctioned by PFC is Rs. 240.41 Cr. against NAD of Rs. 334.19 Cr. The detailed scope of work is provided in Annexure-VIII-A.
- Deadline for completion of the project is Sept. 2016.

STATUS OF REDB UNDER 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 this scheme, 90% grant was provided for electrification of un-electrified Households, intensification of partially electrified households and free electricity connections to BPL households in the country. Creation of Rural Electricity Distribution Backbone **(REDB)** with one 33/11 kV (or 66/11 kV) substation in every block where it does not exist falls under this scheme.

The project cost for REDB is Rs. 77.03 Cr, which includes Rs. 3.66 Cr. as agency charge for PMC & TPIA. The Roll out plan of REDB in Mizoram shows an allocation of Rs. 35.28 Cr. in FY 2016-17, Rs. 24.21 Cr. in FY 2017-18 & Rs. 13.88 Cr. in FY 2018-19. However, NAD was made for Rs. 139.00 Cr. The detailed scope of work is provided in Annexure-VIII-B.

DEEN DAYAL UPADHYAYA GRAM JYOTI YOJANA (DDUGJY)

Government of India launched Deendayal Upadhyay Gram Jyoti Yojana (DDUGJY) on 3rd December, 2014 for;

(i) Strengthening and augmentation of sub-transmission & distribution infrastructure in rural areas, including metering of distribution transformers/ feeders/ consumers.

(ii) Rural electrification for completion of the targets laid down under RGGVY for 12th and 13th Plans by carrying forward the approved outlay for RGGVY to DDUGJY.

The components at (i) of the above schemes 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.

At present DDUGJY (Connecting the unconnected) is under execution in 29 Villages, 15 Habitations and 933 BPL H/H in 08 districts of Mizoram.

The project cost is Rs. 30.28 Cr. excluding an amount of Rs. 0.15 Cr. for PMA. The NAD was of Rs. 30.28 Cr. The Roll out plan of DDUGJY in Mizoram shows an allocation of Rs. 10.35 Cr. in FY 2016-17, Rs. 10.89 Cr. in FY 2017-18 & Rs. 9.04 Cr. in FY 2018-19. The detailed scope of work is provided in Annexure-VIII-C.

The status for RGGVY (X, XI & XIIth plan) and DDUGJY as on 31.01.2016 shows that an amount of Rs. 304.33 Cr. has been sanctioned against Rs. 424.68 Cr. 170 No. of UE villages have been electrified out of 199 Nos., 517 No. of Intensive electrification of villages have been carried out of 517 Nos. and 29263 Nos. of BPL HH connections have been provided out of a total of 29263 Nos. for the state of Mizoram.

The state intends to electrify remaining 29 UE villages along with 16 nos. of rural habitations in phase wise manner – 14 nos. UE villages & 8 nos. of habitations in FY 2016-17 and remaining 15 nos. UE villages & 8 nos. of habitations in FY 2017-18

NORTH EASTERN COUNCIL (NEC) FUNDING

North eastern council (NEC) under the Ministry of Development of North Eastern Region (Ministry of DONER), Govt. of India, has been involved in the process of development of all the eight states of North Eastern Region (NER) and contributing to the socio-economic development of the people of this region by providing financial assistance to the schemes/projects in various sectors.

At present works under NEC funding is undergoing in two districts of Mizoram i.e Kolasib and Lunglei.

The project cost is Rs. 13.72 Cr. The Roll out plan of NEC in Mizoram shows an allocation of Rs. 2.74 Cr. in FY 2015-16, Rs. 4.12 Cr. in FY 2016-17, Rs. 4.12 Cr. in FY 2017-18 & Rs. 2.74 Cr. in FY 2018-19. The detailed scope of work is provided in Annexure-VIIID.

NON LAPSABLE CENTRAL POOL OF RESOURCE (NLCPR) & SPA FUNDING

NLCPR under the Ministry of Development of North Eastern Region (Ministry of DONER), Govt. of India, has been involved in the process of development of all the eight states of North Eastern Region (NER) and contributing to the socio-economic development of the people of this region by providing financial assistance to the schemes/projects in various sectors.

At present works under NLCPR funding is undergoing in two districts of Mizoram i.e Lwangtlai and Saiha.

The project cost is Rs. 13.72 Cr. The Roll out plan of NEC in Mizoram shows an allocation of Rs. 2.74 Cr. in FY 2015-16, Rs. 4.12 Cr. in FY 2016-17, Rs. 4.12 Cr. in FY 2017-18 & Rs. 2.74 Cr. in FY 2018-19. The detailed scope of work is provided in Annexure-VIIID.

SPA funded project is undergoing in Lunglei district of Mizoram.

The project cost is Rs. 4.22 Cr. The Roll out plan of SPA in Mizoram shows an allocation of Rs. 0.84 Cr. in FY 2015-16, Rs. 1.27 Cr. in FY 2016-17, Rs. 1.27 Cr. in FY 2017-18 & Rs. 0.84 Cr. in FY 2018-19. The detailed scope of work is provided in Annexure-VIIID.

The summary of overall plan against ongoing projects is as under:

Under RAPDRP Scheme, an amount of Rs. 57.59 Crs. has been sanctioned towards commissioning of New S/s and capacity Augmentation works in existing S/s, Rs. 27.86 Crs. towards laying of New HT line/feeders, Rs. 26.15 Crs. towards Feeder Separation, Rs. 31.13 Cr. for Installation of New DTRs, Rs. 50.88 Crs for works related to laying of LT Line and providing Service connection to BPL consumers and Rs. 46.74 Cr. towards metering.

Under DDUGJY Scheme an amount of Rs. 3.72 Cr. towards commissioning of New DTRs, Rs. 19.56 Crs. has been sanctioned towards works related to Laying of New HT line/feeders, Rs. 6.72 Crs. towards LT Line works and Rs, 0.28 Crs. towards connection to BPL Households.

Under REDB Scheme an amount of Rs. 29.75 Crs. has been sanctioned towards works related to laying of New 33 kV Line/11 kV Line and Rs. 43.62 Crs. towards commissioning of New S/s. Under NEC Funded Scheme an amount of Rs. 13.72 Crs. has been sanctioned towards works related to commissioning of New S/s.

Proposed Government of India Schemes- Integrated Power Development Scheme (IPDS)

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

(i) Strengthening of sub-transmission and distribution networks in the urban areas.

(ii) Metering of distribution transformer/ feeders/ consumers in the urban areas.

(iii) IT enablement of distribution sector and strengthening of distribution network for completion of the targets laid down under R-APDRP for 12th and 13th Plans by carrying forward the approved outlay for R-APDRP to IPDS.

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.

Against a submitted NAD of Rs. 330 Cr. for 06 towns of Mizoram, MoP, GoI/PFC has in principle approved Rs. 49.16 Cr. only along with 0.25 Cr. For PMA in Phase-I.

The project cost is Rs. 49.16 Cr. The Roll out plan in Mizoram shows an allocation of Rs. 21.32 Cr. in FY 2016-17, Rs. 19.68 Cr. in FY 2017-18 & Rs. 8.16 Cr. in FY 2018-19. The detailed scope of work is provided in Annexure-IX-A.

DEEN DAYAL UPADHYAYA GRAM JYOTI YOJANA (DDUGJY) – DISTRIBUTION SYSTEM STRENGTHENING PLAN

A DPR corresponding to NAD of Rs. 241.45 Cr. (including earlier DDUGJY programme) for 08 districts of Mizoram has been submitted.
The project cost is Rs. 49.91 Cr. The Roll out plan in Mizoram shows an allocation of Rs. 22.93 Cr. in FY 2016-17, Rs. 15.89 Cr. in FY 2017-18 & Rs. 11.09 Cr. in FY 2018-19. The detailed scope of work is provided in Annexure-IX-B.

The summary of overall plan against future projects is as under:

In IPDS Scheme, an amount of Rs. 6.88 Crs. has been allotted towards commissioning of New S/s and capacity Augmentation works in existing S/s, an amount of Rs. 13.04 Crs has been allotted for laying of New HT line/feeders, Rs. 9.93 Crs. For ABC network expansion, Rs. 4.02 Crs. towards installation of DTRs, Rs. 12.38 Crs. towards LT Line work, Rs. 2.85 Crs. for Metering & Rs. 0.06 Crs. towards Installation of Roof Top Solar Panel at SS.

In DDUGJY (Distribution System Strengthening Scheme), an amount of Rs. 16.03 Crs. has been allotted towards commissioning of New S/s and capacity Augmentation works in existing S/s, an amount of Rs. 7.57 Crs has been allotted for laying of New HT line/feeders, Rs. 5.92 Crs. for feeder separation, Rs. 1.41 Crs. towards installation of DTRs, Rs. 18.98 Crs. for Metering.

IT INTIATIVE TAKEN BY P&E D, MIZORAM

R-APDRP Part-A project was implemented in the selected 9 towns (consisting of more that 50% of consumers) in which adoption of Information technology in the areas of energy accounting/auditing will be essential and IT based consumer service centre.

Before implementation of R-APDRP, State Power Department already started computerized

billing and collection at Aizawl and Champhai towns using Java based Billing Software.

Following are the technology up-gradation/renovation and modernization schemes being adopted/ proposed to be adopted through RAPDRP- Pt. (A) - the state is targeting the following objectives.

1) Efforts are given to Non- RAPDRP towns for implementation of computerized billing and collection using stand alone software in which selected sub-divisions are provided with necessary hardware & software.
2) P&E Department makes use of some central Govt. initiatives like Bharat Net. Etc. to have a reliable communication with various offices for data & Voice communication with remote areas.
3) Network analysis and voltage regulation through.
    a) Re-conductoring of long and overloaded 11KV feeders from existing ACSR Weasel to Raccoon.
    b) LT Line associated with new DTs and re-conductoring of long overloaded LT feeders for improvement of voltage regulation and reduction of technical losses.
    c) Distribution Transformers to cater new load and augment existing overloaded DTs with long LT lines.
4) Introduction of ABC in theft prone areas and especially in congested and slum areas.
5) Ring fencing of IPDS towns including additional requirement for RAPDRP towns for completing ring fencing and facilitating full proof online energy audit and account system.
6) Replacement of 49148 electromechanical meters with electronic meters in all 9 towns.
7) Relocation of inaccessible consumer meters to outside of premises for improving billing.

Implementation of IT enabled services for Power consumers

Web based/portal services online system for billing, payment/ collection. Setting up of Customer care centre at Aizawl and providing Toll-free phone line to receive consumer's complaint and redressal.

Opening of payment counters in Bank premises and tying with Postal service for collection of revenue in remote areas.

Reduction in AT&C Losses

The projected losses are summarized below in Table-7.3:

Table-7.3

Sl. No.	Description	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
1.	Intrastate Transmission Loss (%)	3.00	3.00	3.00	3.00
2.	Distribution Loss (%)	26.16	23.84	21.83	18.38
3.	AT&C Loss (%)	31.24	27.38	24.75	20.30

The reasons for high AT&C Losses in the state are primarily the following:

- Deficiency in the organizational setup & Support from Govt. Power Dept.
- Electricity consumer in the state consists mainly of domestic (93%) and very small segment of commercial consumer (6%). The Dept. is neither structured to function as a commercial Organization nor does it receive adequate financial support from the Govt.
- The Dept is also plagued by shortage of manpower. All these factors lead to inefficiency of the power sector. Therefore reduction of AT&C Losses requires a very committed road map/policy of the Govt by considering electricity as a business commodity for essential contribution towards the growth of the economy (resources) while notwithstanding the social obligation in providing energy as a basic need.

- Defective meter, tampering and power theft are the main causes for high AT&C losses. With prepaid metering the AT&C losses in the State may improve drastically and also alleviate shortage of manpower.
- The state is forced to maintain a high HT line length ratio owing to the hilly terrain and sparsely distributed population of the region. This distributed population not only increased the capital investment requirements of the state but also makes the maintenance and monitoring of the network very difficult.

P&E D have envisaged following measures for bringing down AT&C losses;

1. Installation of meters outside the consumer premises.
2. Identification of loss prone area by tagging of consumers with DTs and feeders for energy accounting.
3. Introduction of ABC in theft prone and congested areas.
4. Replacement of defective /electro mechanical meters with static meters in 9 towns.
5. Setting up of more no. of Bill collection counters and implementation of Online Bill payment system.
6. Improvement in HT/LT ratio.
7. Formation of Special Task Force for raid against theft.
8. Implementation of IT enabled services for power consumers. This has great potential in reducing losses and providing consumer friendly services.
9. Introduction of modern technologies to monitor reliable and quality power supply:

Improving Consumer Convenience & Revamping Maintenance Philosophy

O&M processes for consumer complaint management and network maintenance are manual in nature. Computerized system for recording complaint details and time taken for complaint resolution is under implementation in P&E D.

In distribution, every sub-division has a consumer grievance redressal cell where consumers can lodge complaints. There is a consumer grievance redressal forum in the head office at Aizawl.

Central complaint centre for taking consumer complaints is formed under APDRP, Part-A, at Aizawl. The complaints of the consumers are directly transferred to the concerned O&M team for resolution. The monitoring and reviewing of the complaints is done at head Office Level. Consumer can also register their complaints through SMS and Emails.

For improving further and make the process more transparent state regulator can undertake Customer Satisfaction Survey through some independent agency.

For improving consumer convenience, more no. of Bill collection counters and site office were set up. Deptt. is also taking necessary steps for approval of the Govt. in implementing online Bill payment system.

Performance Monitoring Mechanism

As far as consumer's complaint is concerned, Deptt. Officials and staff always attend immediately unless it is a major breakdown of lines or transformers failures.

Revenue Collection target is fixed for every Division/Sub-Division every year. Close monitoring of Revenue/commercial performance is carried out at the Directorate and Circle level on Quarterly basis and monthly/bi-monthly with field officers. Meeting with Zone and with overall incharge shall take place on Half Yearly and Annual Basis respectively. Also special focus is given on the High Value consumers.

In order to implement appropriate reform measures and meet the objective, baseline parameters needs 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 the DISCOM Corporate level.

Table-7.4

Corporate Strategic Objectives	KPI	UOM
Maximize Rate of Return	PAT	Rs Crores
	No of households to be electrified	Nos in Lakhs
	CAPEX	Rs. Crores
Sustain AT&C loss level & achieve further reduction	AT&C Losses	%
	Collection Efficiency	%
	Billing Efficiency	%
Monitoring Distribution Cost	Establishment Cost	Rs. Crores
	R&M Cost	Rs. Crores
	A&G Cost	Rs. Crores
	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

Table-7.5

ASSESMENT OF ADEQUACY OF DISTRIBUTION SYSTEM

Sl. No	Description	Units	Existing As on 15.12..2015	Capacity addition up to FY 2018-19	Total
1	33/11 kV				
a	New PSS	Nos.	67	16	83
b	Augmentation of PSS	Nos.	-	8	08
2	Total 33/11 kV PSS Capacity including Augmentation	MVA	204.60	103.40	308.00
3	11/0.415kV NEW Distribution Transformer Capacity	Nos.	1623	361	1984
4	Total 11/0.415kV Distribution Transformer Capacity including Augmentation	MVA	200.52	51.11	251.63

From the above table it is evident that the transformation capacity at 33/11kV level is projected to grow from 204.60 MVA in FY2014-15 to 308.00 MVA in FY 2018-19.

The Projected peak demand of the state, including demand of large industrial consumers upto 33 kV level, has been Projected at 132.00 MW in FY 2018-19. The large industrial consumers comprise of only 11 kV Bulk consumers in case of Mizoram. The energy billed for HT (Industrial) for FY2014-5 is 8.64 MU.

The demand met at 11 kV and below is 132.00 MW which corresponds to 147.00 MVA considering a power factor of 0.9. Against this peak requirement, the installed capacity at 33/11kV level in FY 2018-19 is projected at 308.0 MVA. This translates into an average loading of 47.73 % on 33/11kV transformers under peak demand conditions.

From the aforesaid it can be concluded that the overall substation capacity planned for FY 2018-19 would be adequate for meeting the projected demand.

The transformation capacity at 11/0.415 kV level is projected to grow from 200.52 MVA in FY 2014-15 to 251.63 MVA in FY 2018-19.

Similarly the load of 11 kV consumers in FY 2018-19 is about 1.43 MW.

Correspondingly the demand met at 11 kV and below comes to 130.57 MW (132.00-1.43) which corresponds to 145.00 MVA considering a power factor of 0.9. Against this peak requirement, the installed capacity 11/0.415kV level in FY 2018-19 is projected at 251.63 MVA, which is adequate to meet the 24x7 PFA requirements. This translates to an average loading of 57.62% on 11/0.415 kV Transformers under peak demand conditions.

From the aforesaid it can be concluded that Distribution Transformation capacity planned at DTR level for FY 2018-19 would be adequate for meeting the projected demand.

Fund Requirement

The fund requirement for the GoI proposed scheme including other schemes

Table-7.6

(In Rs Crores)

	Project Cost	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	Remarks
IPDS (Phase-I)	49.16	0.00	21.32	19.68	8.16	
DDUGJY (Dist. System Strengthening)	49.91	0.00	22.93	15.89	11.09	

ACTION POINT-FOR STATE GOVERNMENT

1. There are 22007 HH unelectrified in the state (both rural and urban) as of 2015. In line with GOI policy of 24x7 Power for all, state Govt. is committed to take up 100% HH electrification. Under Xth Plan RGGVY, 16 nos. of UE villages comprising of 2386 nos. of HH's have been electrified in FY 2015-16 along with departmental electrification of another 3614 HH's making a total of 6000 nos. of electrified HH's. Under DDUGJY scheme for rural consumers, 14 nos. of villages along with 8 nos. of habitations are proposed to be electrified by FY 2016-17. During FY 2016-17 14000 nos. of UE HH's are also proposed to be electrified departmentally. Further remaining 15 nos. of villages along with 8 nos. of habitations are proposed to be electrified by FY 2017-18. During FY 2017-18, 1728 nos. of UE HH's are also proposed to be electrified departmentally, which will complete the process of rural electrification. 279 nos. of urban UE HH's have already been electrified departmentally during current FY 2015-16.
2. To meet the agreed trajectory of AT&C loss, the deptt. is targeting reduction of ATC& loss through implementation IT enabled system under on-going RAPDRP project and the proposed IPDS.
3. Regarding revision of tariff, necessary tariff petition has been filed to JERC for fixation. For recovery of Bills necessary action has been taken against JERC electricity supply code.
4. With negligible resources of its own, the state is wholly dependent on the central government funds for all development activities.
5. The state consists mainly of domestic (93%) and very small segment of commercial consumer exist (6%), who are paying much less than the cost of supply. Hence, the AT &C losses will increase further. If the objective of 24X7 PFA is to be met, there shall be provision to recover the cost supply without Govt. budgetary support to meet the ARR gap.

6. P&E D is Govt. department functioning through budgetary support of the state Govt. fund resource under Plan and Non Plan which are sourced from GOI grant,

7. There is an shortage of manpower both for maintenance and commercial. Further there is deficiency in the organizational setup & support from Govt. Power Dept. All these factors lead to inefficiency of the power sector.

GOI Intervention

- Due to financial problem of the state Govt. the state do not have action plan for Distribution improvement. Hence, it depends on the central schemes like R-APDRP, DDUGJY, IPDS, NEC, REDB, NLCPR, SPA etc.

- GoI may formulate mechanism for effective and timely implementation of the tariff policies, thereby lessening the gap between cost of supply and electricity tariff passed on to the consumers. This will reduce the financial burden on the state distribution utilities.

CHAPTER – 8 : RENEWABLE ENERGY STATUS AND PLAN

Renewable energy is increasingly becoming an important source of the energy mix- meeting the twin objectives of energy security and clean energy considerations. Mizoram has good potential for promotion and development of renewable and non-conventional energy projects, particularly Solar & Small Hydro Projects (SHP). State has already prepared liberal policies for promotion of renewable energy generation.

Government of Mizoram is keen to tap renewable power potential of the state to meet the growing demand of power in an environmental friendly and sustainable manner. Aizawl have already been declared as Solar City under the MNRE program of Solar/ Green Cities.

The areas of studies are:

- Renewable energy generation plans especially for Solar & Small Hydro based power projects
- Renewable Energy Potential of Mizoram
- Renewable Energy policy framework in Mizoram
- Government of Mizoram Initiatives & RPO targets
- Action plan of the state
- Fund Requirements
- GoI/ State Govt Interventions

Grid Connected Renewable Energy

The total grid connected Renewable Energy (RE) installed capacity (consisting of solar, SHP etc.) as on 31.03.15 is given in Table 8.1 below:

Table-8.1

Sl. No.	Ownership/ Sector	Mode wise Breakup (MW)				Grand Total (MW)
		Solar	Wind	SHP	Biomass	
1	State	0.00	0.00	17.05	0.00	17.05
2	Private/ IPPs	0.00	0.00	0.00	0.00	0.00
3	Central	0.00	0.00	0.00	0.00	0.00
	Total	0.00	0.00	17.05	0.00	17.05

The potential of generation of power through Renewable Energy Sources in Mizoram state is estimated to be about 9262 MW as indicated in Table 8.2 below:

Table-8.2

Sl. No.	Type	Estimated Potential in MW (as per MNRE)
1	Solar Power	9090.00
2	Biomass Power	1.00
3	Wind Power	-
4	Small Hydro Power (SHP)	169.00
5	Waste to energy	2.00
	TOTAL	**9262.00**

Policy and notifications

The following policies are issued/under preparation by Zoram Energy Development Agency (ZEDA), Government of Mizoram (GoM):

a) Renewable Energy Policy 2003 (No. B. 12012/19/2002-P&E dt 30.09.2003).

b) Hydro Electric Power Policy of MIZORAM 2010 (No.B.24013/10/2009-P&E dt 16.08.2010.)

c) Mizoram Solar Power Policy 2015 (under approval)

State Designated Agency

Zoram Energy Development Agency (ZEDA), Mizoram is the State Nodal department for promotion and development of Renewable Energy projects. It is also the State department for Renewable Energy Certificates (REC) accreditation.

Renewable Purchase Obligation (RPO):

Every obligated entity (captive users, open access customers etc.) shall purchase electricity from RE sources including solar, not less than a percentage specified by Joint Electricity Regulatory Commission (JERC) for Manipur and Mizoram, from time to time. For Mizoram RPO fixed by JERC Regulation (i.e. Renewable Purchase Obligation and its Compliance-2014) is as shown in Table-8.3 below:

Table -8.3

Year	FY 2015 -16	FY 2016 –17	FY 2017 - 18	FY 2018 – 19
Non Solar RPO (%)	9.00	9.00	9.00	9.00
Solar RPO (%)	0.75	2.00	3,00	4.00
Total RPO (%)	**9.75**	**11.00**	**12.00**	**13.00**

Capacity Addition Plan:

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

Table-8.4

Sl. No.	Particulars	Year wise Existing & Likely Capacity to be added (MW)-Cumulative				
		As on March 2015	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
a.	Solar	0.00	0.00	7.50	20.00	40.00
b.	Wind	0.00	0.00	0.00	0.00	0.00
c.	SHP	17.05	17.05	26.55	35.55	42.55
d.	Biomass	0.00	0.00	0.00	0.00	0.00
	Total	**17.05**	**17.05**	**34.05**	**55.55**	**82.55**

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 Mizoram as per the following roll out plan:

Table -8.5

Sl. No.	Power For All (Roll Out Plan)	Year wise Addition (MW)				Total (MW)
		FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
a.	Solar	0.00	7.50	12.50	20.00	40.00
b.	Wind	0.00	0.00	0.00	0.00	0.00
c.	Small Hydro Power	0.00	9.50	9.00	7.00	25.50
d.	Biomass	0.00	0.00	0.00	0.00	0.00
	Total	**0.00**	**17.00**	**21.50**	**27.00**	**65.50**

Total fund requirement (Year wise) for various projects is given here under:

Table-8.6

Fund Requirement

Sl. No.	RES Projects	Year wise Fund Requirement (Rs. In Crores)				Total (Rs in Cr.)
		FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
a.	Solar	0.00	60.00	100.00	160.00	320.00
b.	Wind	0.00	0.00	0.00	0.00	0.00
c.	Small Hydro Power	0.00	57.00	54.00	42.00	153.00
d.	Biomass	0.00	0.00	0.00	0.00	0.00
	Total	**0.00**	**117.00**	**154.00**	**202.00**	**473.00**

Tentative target proposed for Grid connected Solar Roof top Projects for Mizoram has been given below :

Table-8.7

S. No.	Particulars	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
1.	Solar Roof Top	1	6	6	8

The state nodal agencies, Solar Energy Corporation of India and distribution companies (DISCOMs) of the respective states are the designated agencies for the implementation of grid connected solar roof top program. The subsidy/ Central Financial Assistance (CFA) for the programme, if any will be provided through these implementing agencies.

Intervention by Govt. of Mizoram

a) GoM may submit their proposal to MNRE for VGF funding as per norms of the scheme.

b) Set up single window clearances mechanism to expedite clearances of NCE / RNES projects.

c) To provide solar energy generation based rebate in electricity bills for motivating consumers to install solar power plants.

d) Policies that are under Approval stage/Draft stage are needed to be finalized and put in place expeditiously.

Intervention by GOI

a) Viability Gap Funding (VGF) as applicable for various Solar Projects in the State.

b) Facilitate provision of fund for development of small hydro projects through MNRE, NEC and ministry of DONER.

CHAPTER – 9: ENERGY EFFICIENCY

With increasing importance being given to low carbon growth these days, the cheapest and most affordable option to overcome the energy deficit is Demand Side Management (DSM) and implementation of energy efficiency measures in various sectors such as Agriculture, Domestic, Commercial, Street Lighting & 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 practiced.

Going by the experience of other states, the most common measures of DSM, as applicable to the State of Mizoram, is given in Table 9.1. The average normative approximate savings for each measure is also furnished in the Table.

Table-9.1

Sector	DSM Technique	Energy saving Potential as % of total consumption	Investment/MU of savings (INR Crores)
Domestic	Replacement of ICLs with LED bulbs	23%	0.8
Commercial	Retrofitting of Energy efficient equipments	15%	1.5
Street lighting	Replacement of existing street light with LEDs	51%	2.0

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 the authority. In other sectors, serious awareness campaign through stakeholders' consultation is required to achieve and enhance the desired energy savings.

Enlisted below are some of the DSM measures and energy efficiency initiatives to be taken up by the state of Mizoram.

- Mandatory use of LED / CFL in Govt. buildings / Govt. aided institutions / Boards / Corporations.
- Promotion of Solar water heating system in domestic sector
- Solar Water Heating System to be 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 Govt. buildings, Residential Schools, Educational Colleges, Hostels, Technical/ Educational Institutes, District Institute of Education and Training, Tourism Complexes etc.
- Use of star rated pumps to be mandated for PWW / PHED / Agriculture sector.

Government of Mizoram (GoM) Initiatives:

To encourage Energy Efficiency (EE) and DSM, GoM has taken up initiatives as indicated below:

a) Replacement of Incandescent bulb

In a slum area in the capital city all the incandescent bulb (2000 Nos) in that area were replaced with CFL for which total energy saving was 2.92 lakhs unit per annum.

b) Investment Grade Energy Audit (IGEA) of Govt. buildings:

For assessing energy savings potential by using efficient luminaries, DPRs are prepared and submitted to BEE for sanctioning funds. DPRs are prepared for the following buildings.

1. **Civil Hospital, Aizawl**
2. **Mizoram Assembly House, Aizawl**
3. **Secretariat Block 'C', Aizawl**
4. **Raj Bhavan, Aizawl.**
5. **Chief Minister Secretariat Complex, Aizawl.**
6. **Tourist Lodge, Aizawl.**
7. **State Guest House, Aizawl.**

c) Replacement of less efficient pumps in Drinking Water System, "Chanmari Booster" Aizawl. The annual energy saving is expected to be 72097 kWh.

d) Replacement of Street Light

1) Aizawl – Replacement of 116 Nos. of 250 Watt HPSV Lamp with 90 Watt LED Lamp completed, which resultedin net energy saving of 74,518 kWh/annum.

2) Lunglei- Replacement of 120 Nos. of 250 Watt HPSV Lamp with 90 Watt LED Lamp completed. whichresultedin net energy saving of77,088 kWh/annum.

3) Serchhip – Replacement of 170 Nos. 250 Watt HPSV and 30 Nos. 150 Watt HPSV Lamps with 90 Watt, which resulted in net energy saving of 1,16,435 kWh/annum.

4) Kolasib – Replacement of 75 Nos. of 250 Watt HPSV Street lights with 90 Watt LED Street lights, which resulted in net energy saving of 48,180 kWh/annum.

5) Champhai – Replacement of 75 Nos. of 250 Watt HPSV Street lights were replaced by 90 Watt LED Street lights. which resulted in net energy saving of 48,180 kWh/annum.

6) Aizawl – Replacement of 50 Nos. of 250 Watt HPSV Street lights were replaced by 90 Watt LED Street light. which resulted in net energy saving of 32120 kWh/annum.

e) LED Village:

1) Buangpui and Neihloh Village

LED Bulb and Street light is distributed:

a) LED Bulb 8 (W) - 220 Nos.
b) LED Bulb 6 (W) - 120 Nos.
c) LED Street Light 20(W)- 7 Nos.

All the 340 Nos. of incandescent bulbs (100 Watt – 188 Nos., 60 Watt 116 Nos. and 40 Watt – 36 Nos.) removed from the premises of above villages and destroyed.

2) Muthi Village:

The following LED luminaired were distributed to the consumers:

a) LED Bulb (8 W) - 550 Nos.
b) LED Tube Light 4 Feet (20 W)- 198 Nos.
c) LED Street Light(45 W) - 20 Nos.

The energy saving is 1,17,174kWh/annum.

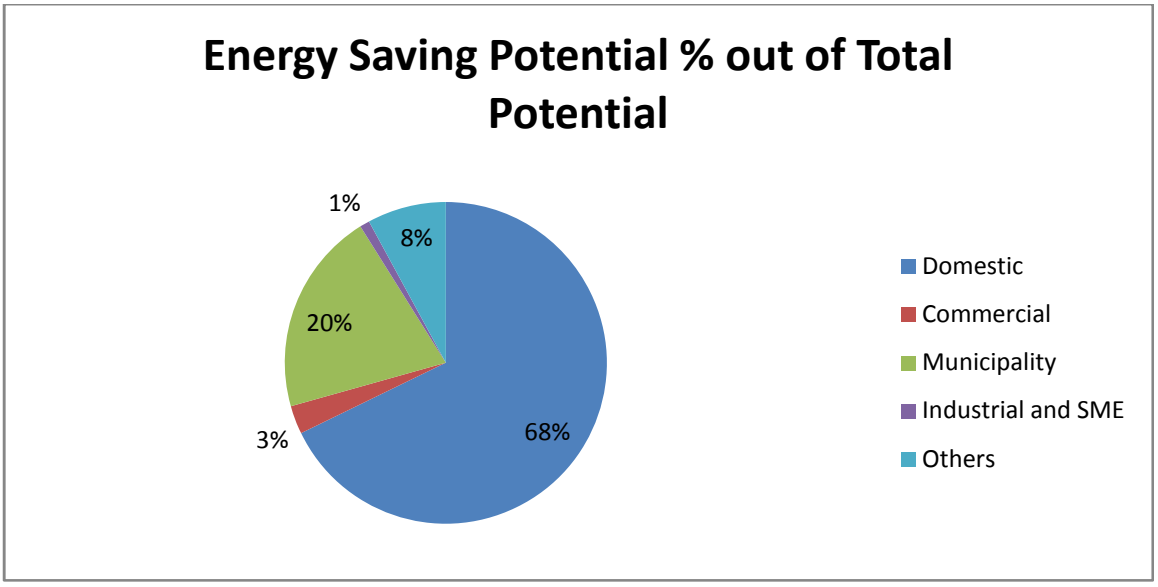
The various steps taken by State of Mizoram for implementation of DSM and Energy Efficiency measures till March 2015 are indicated in Table-9.2.

Table- 9.2

DSM and Energy Efficiency Measures and its achievement till 31 Mar 2015

Sl. No	PARTICULARS	Quantity	Energy saving per unit /year (kWh)	Annual Energy Savings (MU)	Remarks
1.	**Replacement of ICL (100watt) with 7 W LED bulbs**				
a.	Neihloh & Buang village (6W-120 nos. & 8W-220 nos. LED bulb)	340	6W-171.55 8W-167.90	0.058	
b.	Muthi village (8W – 550 nos.)	550	167.90	0.092	
2.	Replacement of Tube Light with LED Tube light	250	36.50	0.009	
3.	**Replacement of street light (1000, 250, 150 watt) with LED light**				
a.	90W LED	616	642.40	0.40	Energy saving based on 250W.
b.	45W LED	20	823.07	0.016	Energy saving based on 250W
c.	20W LED	7	923.45	0.018	Energy saving based on 250W
	Total			**0.593**	

As per the sector specific Energy Conservation plan for the State of Mizoram, energy saving potential is as follows:



The saving potential and the baseline electricity consumption are employed in formulating the implementation plan for the preparatory activities as well as for the implementation of energy efficiency measures. It is estimated that 114.37 MU (about 34.25%) of electricity can be saved from the current level of consumption in the state through various energy conservation measures (ECM). Maximum energy saving potential is identified in the Domestic sector (i.e 68 %) sector followed by Municipality sector (i.e. 20%). Considering the big share of Domestic sector as well as Municipality sector, five year plan is developed and given below;

Table- 9.3

Domestic Sector 5 year Plan

S. No	Recommendation	Investment Required (in lacks)					
A.	**Policy Intervention**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
1.	Mandatory prepaid metering of existing unmetered domestic consumers in Mizoram.	86	83	83	83	83	418
2.	Ban on the sale of Incandescent Bulbs, T-12 Tube Lights and Electromagnetic Ballasts.	2	1	1	1	1	6
3.	15 % Tax incentives/waive off for new electrical appliances based on star rating.	34	36	38	40	42	190
B.	Energy Efficiency Schemes/ Pilot Projects.						
1.	DSM Programme for implementing of LED Lighting.	1053	1014	1025	1037	1049	5178
	Total	**1175**	**1134**	**1147**	**1161**	**1175**	**5792**

Table- 9.4

Municipality sector – 5 Year Plan

S. No	Recommendation	Investment Required (in lacks)					
A.	**Policy Intervention.**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
1.	Bring out notification/ Circular for all the pumping stations clearly mentioning the minimum threshold for maintaining minimum motor and pump efficiency and power factor based for new pumping stations.	2	0.5	0.5	0.5	0.5	4
2.	Notification for mandating automatic on/off controller for all public/ street lighting connections.	23	26	26	35	36	146
B.	Implementation of Energy Efficiency Schemes						
1.	Conducting IGEA and Replacement/ Retrofitting program for inefficient pumps.	36	706	887	338	88	2055
2.	Installation of appropriate size capacitors for power factor correction.	58.2	58.2	58.2	58.2	58.2	291
3.	Replacement/ Retrofitting Program for incandescent and other inefficient lights with equivalent efficient lights (LEDs) meeting the proper lumen requirement of a particular place.	85	85	85	85	85	425
4.	Umbrella contract with EESL to serve as the implementing agency for ESCO projects in PWW and Street Lighting.	15	15	15	15	15	75
	Total	**219.2**	**890.7**	**1071.7**	**531.7**	**282.7**	**2996**

Policy and notification in Place

Energy Conservation Building Code (ECBC) has been launched by Bureau of Energy Efficiency, MOP, GOI on 27th May, 2007 to be implemented on voluntary basis. The code is applicable to buildings/ building complexes that have a connected load/ contract demand of 100 kW/ 120 KVA and more or having conditioned area of 500 sq meters or more. Drafting committee for amendment of ECBC for the state has been formed.

Agency responsible for DSM

Mizoram Electrical Inspectorate has been designated as State Designated Agency (SDA, Mizoram) to coordinate, enforce and implement the Energy Conversation Measures in the state in accordance with the provisions contained in the Energy Conservation Act-2001 (Central Act

52 of 2002), in consultation with Bureau of Energy Efficiency (BEE), Ministry of Power, GoI.

Objectives and suggested Interventions

The doemstic sector accounted for about 66.56% (217 MUs) of the state's total energy consumption (327 MUs) during 2014-15. Substantial saving potential (about 23% i.e about 75 MUs) exists in this sector through replacement programmes by energy efficient lighting and by promoting use of other energy efficient electrical appliances. 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 Lamps (ICLs). The programme is expected to reduce annual energy consumption of the state by more than 75 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 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.

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 warrantee
- No impact on tariff
- Total upfront investments by EESL
- Benefits sharing approach

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.

Approach / Strategy

All the above interventions involve replacement of inefficient equipment / appliances with energy efficient ones for the domestic, commercial buildings and Street Lighting Sectors. **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.

Action 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.
- To expedite provision of fund to the State Government for implementation of DSM and Energy Efficiency Measures.

State Government

- Ensure formulation of a detailed time line in consultation with concerned departments for implementation of DSM and Energy Efficiency Measures in the State.

- 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 Mizoram 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 Mizoram 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, Joint Electricity Regulatory Commission (JERC) for the states of Manipur and Mizoram may be requested to issue directives for creation of DSM funds by Utilities of the State so that DSM activities can get extra emphasis. Such funds can be utilized for meeting incremental cost of efficiency improvement.

CHAPTER – 10 : FINANCIAL VIABILITY

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:

a) At targeted growth rate and other parameters as per "24x7 Power for All" Road Map (Base case).

b) Same as (a) and tariff hikes for viability, if required.

c) Non-Adherence to AT & C Loss Reduction Trajectory and subsequent dependence on higher tariff hike for viability.

d) 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

1. Average cost of power purchase has been considered as Rs. 4.20 per unit. The details are given as hereunder:

Table-10.1

FY 2014-15

Sl. No.	Description	Unit	Total
A	**Units Purchased**		
1.	Total power purchased	MU	442.01
2.	Less PGCIL Losses	MU	included
3.	Net power purchased (At state periphery)-A	MU	442.01
B	**Power purchase cost**		
1	Total power purchase cost	Rs Cr.	185.65
2	PGCIL charges	Rs Cr.	included
3	Total cost of purchase-B	Rs Cr.	185.65
	Average purchase cost (At state periphery) (B/A)	**Rs./ kWh**	**4.20**

Source: Tariff Order for FY 2015-16

2. No change in power purchase cost, as any change in the power purchase cost will be taken care by the Fuel and Power Purchase Cost Adjustment mechanism.

3. Escalation towards O&M cost (excl employees cost) and administrative and General expenses has been considered @ 6% p.a. in line with average changes in WPI;

Table-10.2

Month/ Year	WPI Indices	CPI Indices
Average 2012-13	168	215
Average 2013-14	178	236
Increase	5.95%	9.8%
Say	6.0%	10%

Source: eaindustry.gov.in

4. Escalation towards Employee Cost has been considered @ 10% p.a. based on CPI Indices.

5. Purchase Demand considered as forecasted in previous chapters.

6. Grant, Loan and Equity ratio has been considered as 85%:10%:5% for DDUGJY/IPDS schemes as Mizoram comes under Special Category States. All other investments have been considered for funding as per Debt equity ratio 70:30. Funding in NEC Plan/NLCPR Plan and SAP Plan is treated as 90% grant and 10% loan as per its guidelines.

7. Ongoing schemes like REDB Plan (RGGVY) is considered as per their respective guidelines and all other investments have been considered for funding as per Debt equity ratio 70:30.

8. Project completion period has been considered as 2 years and its Interest During Construction (IDC) has been capitalised.

9. Interest on future long term loan and Working Capital loan has been calculated @ 12% p.a. as per existing loan profile.

10. The existing average billing rate was Rs 3.98/kWh in FY 2015-16 based on tariff order for FY 2015-16. However, from FY 2015-16 to FY 2018-19, the average billing rate has been considered based on weighted average ABR, as shown hereunder:

Table-10.3

Year	Rs./kWh
FY 2015-16	3.99
FY 2016-17	3.98
FY 2017-18	3.97
FY 2018-19	3.97

The details of weighted average billing rate is given in Annexure-XII.

11. 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 Rs 3/kWh has been adopted.

12. Revenue subsidies & Grants considered same as previous period levels.

13. Depreciation has been computed @ average 0.4% for existing assets and 5.28% for new incoming assets.

Scenario A: Targeted Growth Rate as per 24x7 Road Map (Base Case)

Assumptions

- ✓ No tariff hike and change in power purchase cost.
- ✓ AT&C losses as per targeted MoP trajectory.

Table-10.4

Financial Position of the Utilities (Scenario A)

Assumptions	SCN-A				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Total unrestricted energy required	MU	373	429	486	549
Requirement at state periphery	MU	521	581	641	693
AT&C losses(as per State trajectory)	%	31.24%	27.38%	24.75%	20.30%
Collection efficiency	%	93.13%	95.36%	96.27%	97.65%
T&D Losses	%	28.38%	26.12%	24.18%	20.83%
Power purchase cost	Rs/Unit	4.20	4.20	4.20	4.20
Energy available at state periphery	MU	458	555	666	768
Shortage/Surplus of Power	MU	-63	-26	25	75
State's Own Generation	MU	47	135	227	329
Purchased Power	MU	474	446	439	439
Revenue Parameters					
Average billing rate	Rs/Unit	3.99	3.98	3.97	3.97
Tariff increase	%	0%	0%	0%	0%
Effective Average billing rate	Rs/Unit	3.99	3.98	3.97	3.97
Energy sold within state	MU	373	429	486	549
Energy sold to other states	MU	0	0	25	75
Expense					
Employ cost escalation	%	10%	10%	10%	10%
Repair & Maintenance escalation	%	6%	6%	6%	6%
Administrative & General escalation	%	6%	6%	6%	6%
Financial position of Utility	**SCN-A**				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Net sales-Power	Rs Crores	149	171	200	240
Other income like meter rent,theft recovery etc	Rs Crores	0	0	0	0
Revenue, Subsidies & Grants	Rs Crores	151	151	151	151
Other income	Rs Crores	3	4	4	4
Total Income		**303**	**325**	**355**	**396**
Expenditure					
Power Purchase	Rs Crores	199	187	184	184
Generation of Power	Rs Crores	8.52	8.82	9.13	9.13
Employee cost	Rs Crores	90	99	109	120
R & M Cost	Rs Crores	17	18	19	21
Admn. & General expenses	Rs Crores	1.5	1.6	1.7	1.8
Others	Rs Crores	0	0	0	0
Total expenses		**316**	**315**	**324**	**336**
Gross Profit	Rs Crores	-13	10	32	60
Interest	Rs Crores	7	19	26	26
Depreciation	Rs Crores	14	39	66	87
Profit before tax	Rs Crores	-34	-47	-60	-53
Tax	Rs Crores	0	0	0	0
Net Profit after taxes		**-34**	**-47**	**-60**	**-53**

The projected scenario exhibits the continuation of loss making situation in the forthcoming period and tariff hikes would be required if turnaround is to be achieved.

Scenario B: Targeted Growth Rate as per 24x7 Road Map and Turnaround with Tariff Hikes.

Assumptions

- ✓ All other assumptions as per Base-case(Scenario-A)
- ✓ Turnaround considering tariff hike.

Table-10.5

Financial Position of the Utilities (Scenario B)

Assumptions	SCN-B				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Total unrestricted energy required	MU	373	429	486	549
Requirement at state periphery	MU	521	581	641	693
AT&C losses(as per State trajectory)	%	31.24%	27.38%	24.75%	20.30%
Collection efficiency	%	93.13%	95.36%	96.27%	97.65%
T&D Losses	%	28.38%	26.12%	24.18%	20.83%
Power purchase cost	Rs/Unit	4.20	4.20	4.20	4.20
Energy available at state periphery	MU	458	555	666	768
Shortage/Surplus of Power	MU	-63	-26	25	75
State's Own Generation	MU	47	135	227	329
Purchased Power	MU	474	446	439	439
Revenue Parameters					
Average billing rate	Rs/Unit	3.99	3.98	3.97	3.97
Tariff increase	%	0%	9%	7%	6%
Effective Average billing rate	Rs/Unit	3.99	4.34	4.63	4.91
Energy sold within state	MU	373	429	486	549
Energy sold to other states	MU	0	0	25	75
Expense					
Employ cost escalation	%	10%	10%	10%	10%
Repair & Maintenance escalation	%	6%	6%	6%	6%
Administrative & General escalation	%	6%	6%	6%	6%
Financial position of Utility	**SCN-B**				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Net sales-Power	Rs Crores	149	186	233	292
Other income like meter rent,theft recovery etc	Rs Crores	0	0	0	0
Revenue, Subsidies & Grants	Rs Crores	151	151	151	151
Other income	Rs Crores	3	4	4	4
Total Income		**303**	**341**	**387**	**447**
Expenditure					
Power Purchase	Rs Crores	199	187	184	184
Generation of Power	Rs Crores	8.52	8.82	9.13	9.13
Employee cost	Rs Crores	90	99	109	120
R & M Cost	Rs Crores	17	18	19	21
Admn. & General expenses	Rs Crores	1.5	1.6	1.7	1.8
Others	Rs Crores	0	0	0	0
Total expenses		**316**	**315**	**324**	**336**
Gross Profit	Rs Crores	-13	26	64	112
Interest	Rs Crores	7	19	25	24
Depreciation	Rs Crores	14	39	66	87
Profit before tax	Rs Crores	-34	-32	-26	1
Tax	Rs Crores	0	0	0	0
Net Profit after taxes		**-34**	**-32**	**-26**	**1**

The scenario exhibits the extent of tariff hikes required to make turnaround of situation as shown under scenario –A. The tariff hikes to the tune of 9% in FY 2016-17, 7% in FY 2017-18 and 6% in FY 2018-19 would be able to make turnaround by FY 2018-19.

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

Assumptions

- ✓ AT&C losses higher by 1% than the targeted trajectory.

Power purchase cost constant for all the years.

Table-10.6(a)

Financial Position of the Utility (Scenario C)

Assumptions	SCN-C				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Total unrestricted energy required	MU	373	429	486	549
Requirement at state periphery	MU	528	589	649	702
AT&C losses(as per State trajectory)	%	32.24%	28.38%	25.75%	21.30%
Collection efficiency	%	93.13%	95.36%	96.27%	97.65%
T&D Losses	%	29.35%	27.09%	25.15%	21.80%
Power purchase cost	Rs/Unit	4.20	4.20	4.20	4.20
Energy available at state periphery	MU	458	555	666	768
Shortage/Surplus of Power	MU	-70	-34	17	66
State's Own Generation	MU	47	135	227	329
Purchased Power	MU	481	454	439	439
Revenue Parameters					
Average billing rate	Rs/Unit	3.99	3.98	3.97	3.97
Tariff increase	%	0%	0%	0%	0%
Effective Average billing rate	Rs/Unit	3.99	3.98	3.97	3.97
Energy sold within state	MU	373	429	486	549
Energy sold to other states	MU	0	0	17	66
Expense					
Employ cost escalation	%	10%	10%	10%	10%
Repair & Maintenance escalation	%	6%	6%	6%	6%
Administrative & General escalation	%	6%	6%	6%	6%
Financial position of Utility	**SCN-C**				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Net sales-Power	Rs Crores	149	171	198	238
Other income like meter rent,theft recovery etc	Rs Crores	0	0	0	0
Revenue, Subsidies & Grants	Rs Crores	151	151	151	151
Other income	Rs Crores	3	4	4	4
Total Income		**303**	**325**	**353**	**393**
Expenditure					
Power Purchase	Rs Crores	202	191	184	184
Generation of Power	Rs Crores	8.52	8.82	9.13	9.13
Employee cost	Rs Crores	90	99	109	120
R & M Cost	Rs Crores	17	18	19	21
Admn. & General expenses	Rs Crores	1.5	1.6	1.7	1.8
Others	Rs Crores	0	0	0	0
Total expenses		**319**	**318**	**324**	**336**
Gross Profit	Rs Crores	-16	7	29	57
Interest	Rs Crores	7	19	27	28
Depreciation	Rs Crores	14	39	66	87
Profit before tax	Rs Crores	-37	-51	-64	-57
Tax	Rs Crores	0	0	0	0
Net Profit after taxes		**-37**	**-51**	**-64**	**-57**

scenario exhibits that non adherence to AT & C Loss reduction trajectory would compound the losses further and higher tariff hikes to the tune of 9% in FY 2016-17, 8% in FY 2017-18 and 6% in FY 2018-19 may be required to observe a turn around by FY 2018-19.

Table-10.6 (b)

SCENARIO C with tariff hikes

Assumptions	SCN-C				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Total unrestricted energy required	MU	373	429	486	549
Requirement at state periphery	MU	528	589	649	702
AT&C losses(as per State trajectory)	%	32.24%	28.38%	25.75%	21.30%
Collection efficiency	%	93.13%	95.36%	96.27%	97.65%
T&D Losses	%	29.35%	27.09%	25.15%	21.80%
Power purchase cost	Rs/Unit	4.20	4.20	4.20	4.20
Energy available at state periphery	MU	458	555	666	768
Shortage/Surplus of Power	MU	-70	-34	17	66
State's Own Generation	MU	47	135	227	329
Purchased Power	MU	481	454	439	439
Revenue Parameters					
Average billing rate	Rs/Unit	3.99	3.98	3.97	3.97
Tariff increase	%	0%	9%	8%	6%
Effective Average billing rate	Rs/Unit	3.99	4.34	4.67	4.95
Energy sold within state	MU	373	429	486	549
Energy sold to other states	MU	0	0	17	66
Expense					
Employ cost escalation	%	10%	10%	10%	10%
Repair & Maintenance escalation	%	6%	6%	6%	6%
Administrative & General escalation	%	6%	6%	6%	6%
Financial position of Utility	**SCN-C**				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Net sales-Power	Rs Crores	149	186	232	292
Other income like meter rent,theft recovery etc	Rs Crores	0	0	0	0
Revenue, Subsidies & Grants	Rs Crores	151	151	151	151
Other income	Rs Crores	3	4	4	4
Total Income		**303**	**341**	**387**	**447**
Expenditure					
Power Purchase	Rs Crores	202	191	184	184
Generation of Power	Rs Crores	8.52	8.82	9.13	9.13
Employee cost	Rs Crores	90	99	109	120
R & M Cost	Rs Crores	17	18	19	21
Admn. & General expenses	Rs Crores	1.5	1.6	1.7	1.8
Others	Rs Crores	0	0	0	0
Total expenses		**319**	**318**	**324**	**336**
Gross Profit	Rs Crores	-16	22	64	111
Interest	Rs Crores	7	19	25	24
Depreciation	Rs Crores	14	39	66	87
Profit before tax	Rs Crores	-37	-35	-28	1
Tax	Rs Crores	0	0	0	0
Net Profit after taxes		**-37**	**-35**	**-28**	**1**

Scenario D: Targeted Growth Rate as per 24x7 Road Map and Considering all funding including GoI Schemes in the Debt Equity Ratio of 70:30.

Assumptions

- ✓ At targeted growth rates and loss reduction as per road map.
- ✓ Considering all funding including GoI Schemes in the Debt Equity Ratio of 70:30.

Table-10.7(a)

Financial Position of the Utility (Scenario D)

Assumptions	SCN-D				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Total unrestricted energy required	MU	373	429	486	549
Requirement at state periphery	MU	521	581	641	693
AT&C losses(as per State trajectory)	%	31.24%	27.38%	24.75%	20.30%
Collection efficiency	%	93.13%	95.36%	96.27%	97.65%
T&D Losses	%	28.38%	26.12%	24.18%	20.83%
Power purchase cost	Rs/Unit	4.20	4.20	4.20	4.20
Energy available at state periphery	MU	458	555	666	768
Shortage/Surplus of Power	MU	-63	-26	25	75
State's Own Generation	MU	47	135	227	329
Purchased Power	MU	474	446	439	439
Revenue Parameters					
Average billing rate	Rs/Unit	3.99	3.98	3.97	3.97
Tariff increase	%	0%	0%	0%	0%
Effective Average billing rate	Rs/Unit	3.99	3.98	3.97	3.97
Energy sold within state	MU	373	429	486	549
Energy sold to other states	MU	0	0	25	75
Expense					
Employ cost escalation	%	10%	10%	10%	10%
Repair & Maintenance escalation	%	6%	6%	6%	6%
Administrative & General escalation	%	6%	6%	6%	6%
Financial position of Utility	**SCN-D**				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Net sales-Power	Rs Crores	149	171	200	240
Other income like meter rent,theft recovery etc	Rs Crores	0	0	0	0
Revenue, Subsidies & Grants	Rs Crores	151	151	151	151
Other income	Rs Crores	3	4	4	4
Total Income		**303**	**325**	**355**	**396**
Expenditure					
Power Purchase	Rs Crores	199	187	184	184
Generation of Power	Rs Crores	8.52	8.82	9.13	9.13
Employee cost	Rs Crores	90	99	109	120
R & M Cost	Rs Crores	17	18	19	21
Admn. & General expenses	Rs Crores	1.5	1.6	1.7	1.8
Others	Rs Crores	0	0	0	0
Total expenses		**316**	**315**	**324**	**336**
Gross Profit	Rs Crores	-13	10	32	60
Interest	Rs Crores	7	24	40	45
Depreciation	Rs Crores	14	42	73	96
Profit before tax	Rs Crores	-35	-55	-81	-81
Tax	Rs Crores	0	0	0	0
Net Profit after taxes		**-35**	**-55**	**-81**	**-81**

This scenario exhibits that absence of grant funds would make considerable dent on overall profitability and tariff hikes to the tune of 12% in FY 2016-17, 11% in FY 2017-18 and 9% in FY 2018-19 would have to be resorted to in order to see turnaround by FY 2018-19.

Table-10.7(b)

SCENARIO D with tariff hikes

Assumptions	SCN-D				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Total unrestricted energy required	MU	373	429	486	549
Requirement at state periphery	MU	521	581	641	693
AT&C losses(as per State trajectory)	%	31.24%	27.38%	24.75%	20.30%
Collection efficiency	%	93.13%	95.36%	96.27%	97.65%
T&D Losses	%	28.38%	26.12%	24.18%	20.83%
Power purchase cost	Rs/Unit	4.20	4.20	4.20	4.20
Energy available at state periphery	MU	458	555	666	768
Shortage/Surplus of Power	MU	-63	-26	25	75
State's Own Generation	MU	47	135	227	329
Purchased Power	MU	474	446	439	439
Revenue Parameters					
Average billing rate	Rs/Unit	3.99	3.98	3.97	3.97
Tariff increase	%	0%	12%	11%	9%
Effective Average billing rate	Rs/Unit	3.99	4.46	4.94	5.38
Energy sold within state	MU	373	429	486	549
Energy sold to other states	MU	0	0	25	75
Expense					
Employ cost escalation	%	10%	10%	10%	10%
Repair & Maintenance escalation	%	6%	6%	6%	6%
Administrative & General escalation	%	6%	6%	6%	6%
Financial position of Utility	**SCN-D**				
Description	**Units**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Net sales-Power	Rs Crores	149	191	247	318
Other income like meter rent,theft recovery etc	Rs Crores	0	0	0	0
Revenue, Subsidies & Grants	Rs Crores	151	151	151	151
Other income	Rs Crores	3	4	4	4
Total Income		**303**	**346**	**402**	**473**
Expenditure					
Power Purchase	Rs Crores	199	187	184	184
Generation of Power	Rs Crores	8.52	8.82	9.13	9.13
Employee cost	Rs Crores	90	99	109	120
R & M Cost	Rs Crores	17	18	19	21
Admn. & General expenses	Rs Crores	1.5	1.6	1.7	1.8
Others	Rs Crores	0	0	0	0
Total expenses		**316**	**315**	**324**	**336**
Gross Profit	Rs Crores	-13	31	79	137
Interest	Rs Crores	7	24	37	40
Depreciation	Rs Crores	14	42	73	96
Profit before tax	Rs Crores	-35	-35	-31	1
Tax	Rs Crores	0	0	0	0
Net Profit after taxes		**-35**	**-35**	**-31**	**1**

UDAY SCHEME

Financial implication of UDAY Scheme has not been considered in view of MoP Office Memorandum No.06/02/2015-NEF/FRP(Pt.) dated 13th January 2016. However, Power & Electricity Department of Mizoram may sign MoU with MoP on efficiency parameters stated in UDAY Scheme.

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

Table-11 .1

Proposed communication responsibilities

Communication Objective	Responsibility	Frequency
" Power for all" - Roll Out Plan	E-in-C	Quarterly
Power Supply Position	SE (SLDC)	Daily
Energy Savings & Conservation	CEI, Office of Chief Electrical Inspector and State Designated Agency on Energy Conservation	Monthly
Planned Outages & Disruption	SE (SLDC)	Daily
Real time feeder-wise Information	SE (SLDC)	Daily
Status update on Deliverables	E-in-C	Quarterly
Renewable Power	Zoram Energy Development Agengy (ZEDA)	Quarterly
Generation- Projects, PLF & Fuel	E-in-C	Monthly
Transmission Projects – Physical Progress and Achievements	E-in-C	Monthly
Distribution – Progress, Achievements, Losses, Consumer Initiatives etc.	E-in-C	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.

In Mizoram, IT adoption on a massive scale will required to be pursued in the following areas:

- At the corporate level, the operations need to be integrated through implementation of Enterprise Resource Planning Systems (ERP). This would cover critical aspects like Finance and Accounts, Asset Management, Inventory Management, Human Resource Management, Project Management, Personal information System (PIS). ERP will help in timely capitalization of asset, deriving better business value of investment etc.
- At the commercial operations level there is a need to comprehensively implement Customer Management Systems (CMS) for undertaking customer related processes including billing and collections, customer

complaint management, new connection provision etc.

- Centralized Information & Monitoring System for operational, enforcement & litigation, vigilance activities and analysis.
- Power management would require the institution of technically capable controlling facilities equipped with tools like SCADA and Distribution Management Systems (DMS) that allow for adequate visualization of the networks and response capabilities. Technologies for sub-station automation, GIS, SCADA, DMS, OMS, etc., shall be adopted. For the urban areas SCADA is quite useful for improving reliability and reduction of network downtime.
- Regional Distribution Control Centres (RDCC) within the State are proposed to be established. These will initially cater to the principal load centres, but would thereafter be expanded to all load centres of the state. This will be a key initiative, not only for effectively managing 24X7 supply, but also thereafter for other functions like forecasting.
- Renewable Energy Management centres shall be established and equipped with adequate capabilities through financing availed from KfW and ADB.
- Power procurement optimization tools will be implemented to reduce the power procurement costs and improve supply reliability. This shall be achieved through the institution of technically robust forecasting, scheduling and dispatch (Unit Commitment) and settlement tools. The tools shall be used to ensure that the control room operators have the ability to take real time decisions to ensure cost reduction.
- Project monitoring tools shall be incorporated in the PMU to ensure that progress on the investments in the state are monitored rigorously and bottlenecks identified.
- Standards of service specified under Section 57 of the EA 2003 shall be monitored. The utilities shall use IT tools to gather the information with regards to service standards with minimal manual intervention to ensure transparency and credibility.

The above need to be implemented urgently, and also need to be integrated with each other to ensure that the systems are inter-operable (i.e., they can talk to each other). For this the utilities shall evolve a detailed IT plan to implement the above in a well-coordinated manner.

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**: A Distribution Reforms Committee (DRC) headed by the Chief Secretary has been 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/CE of state utilities.

- **Department Level Committee**: It is proposed that the Department level committee headed by the ACS power/ Secretary Power 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 –ACS Power / Secretary Power and MD/ CEs of state power utilities.
- **District Level Committee** – District Electricity Committee headed by the Honorable M.P and convened by the Deputy Commissioner has already been formed 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 – Deputy Commissioner 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 Department for achieving better results. The details of the present employee in the Power & Electricity Department of Mizoram is as under :

Employee base

Table-11.2

As on 01.04.2015

Name of Dept.	Sanctioned strength	Working position	Vacancy position	Engaged through outsource	Net vacancy
P&E	2182	1776	406	0	406
% vacancy			18.6		18.6

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

There is already a provision for Demand Side Management (DMS) trainings under various programmes of Bureau of energy Efficiency (BEE) and the same should be implemented to achieve the goal of 24 X 7 power for goal. The organization does not have a system for mapping the skill levels and there is no setup for capability development. The employees at various levels & functions at Power & Electricity Department have built their capability/skills largely through on-the-job experience. However, some training programs are being conducted at various levels.

Following training programmes were conducted by Department in the previous financial years for up gradation of knowledge base of their Employees and will also be conducted in the coming years:

Table-11.3

Sl. No.	Name of institute	Training module
1.	ISTM, New Delhi	Ethics & value in Public Governance
2.	ESCI, Hyderabad	IT in Distribution
3.	ESCI, Hyderabad	IT in Distribution

The employees undergo specific training programs on service rules & office management. The same are conducted by the state's Administrative Training Institute (ATI) on periodic basis. Similarly, the Engineering staff undergo trainings conducted by various institutes as elaborated above.

Following courses are proposed to be conducted in FY 2015-16.

Table-11.4

Sl. No.	Name of the Course	Location of training
1.	Phase-3 training for SLDC SCADA, EMS-NER Projects	Noida
2.	DPR Preparation and evaluation for SMP Projects	IIT Roorkee
3.	Numerical relays in power system project	Noida
4.	Small Hydropower Development and Renewable sources of energy	IIT Roorkee
5.	Power System Operation	Guwahati

CHAPTER – 12 : YEAR WISE ROLL OUT PLAN

Deliverables						
Power for All – Roll Out Plan	**Units**	**FY 2015-16**	**FY 2016-17**	**FY 2017-18**	**FY 2018-19**	**Total**
(A) GENERATION						
State Sector	MW	0.00	17.00	21.50	27.00	65.50
Central Sector	MW	0.00	27.20	20.00	20.00	67.20
IPP Projects	MW	0.00	0.00	0.00	0.00	0.00
Total		**0.00**	**44.20**	**41.50**	**47.00**	**132.70**
(B) TRANSMISSION						
Inter State						
Substation (New)						
132/33 kV	Nos/MVA	0	1/25	0	1/25	2/50
Substation (Augmentation)						
132/33 kV	Nos/MVA	0	0	0	1/25	1/25
400 kV Lines	Ckt Km	0	0	0	1/6	1/6
220 kV Lines	Ckt Km	0	0	0	1/116	1/116
132 kV Lines	Ckt Km	0	0	0	4/205.8	4/205.8
Intra State						
Substation (New)						
132/33 KV Substation	Nos/MVA	0	1/25	0	4/87.5	5/112.5
Substation (Augmentation)						
132/33 KV Substation	Nos/MVA	0	0	0	4/75	4/75
Lines (New)						
132 kV Lines	Ckt Km	0	1/59.09	0	8/559	9/728.09
(C) DISTRIBUTION						
New 33/11 kV PSS	Nos	1	6	3	6	16
	MVA	7.83	30.07	10.1	32.6	80.6
Augmentation of 33/11 kV PSS	Nos	0	3	3	2	8
	MVA	0	10.4	8.6	3.8	22.8
R & M work in existing 33/11 or 66/11 kV Substations	Nos.	1	6	6	2	15
New 33 kV Bay	No.	1	5	2	0	8
New 11 kV Bay	No.	0	0	0	0	0
New 33 kV Feeder	Ckt Km	9	84	88	72	253
Re conductoring of 33 kV Feeder	Ckt Km	3.34	44.26	43.6	34.4	125.6

Deliverables						
Power for All – Roll Out Plan	**Units**	**FY 2015-16**	**FY 2016-17**	**FY 2017-18**	**FY 2018-19**	**Total**
New 11 kV Feeder	Ckt Km	26.59	193.65	146.91	92.01	459.16
Re conductoring of 11 kV Feeder	Ckt Km	14.62	22.35	2	0	38.97
DTR (New)						
25 kVA	No.	5	43	30	23	101
63 kVA	No.	28	32	1	1	62
100 kVA	No.	53	61	6	2	122
250 kVA	No.	21	26	3	1	51
500 kVA	No.	11	12	0	0	23
1000 KVA	No.	1	1	0	0	2
DTR (Augmentation)						
63 kVA	No.	0	4	2	0	6
100 kVA	No.	0	13	12	6	31
250 kVA	No.	0	9	2	0	11
New LT Line	Ckt Km	35.92	83.4	26.69	26.15	172.16
Service connection to BPL Consumers	No.	0	327	300	306	933
SS & Feeder Metering	No.	0	70	44	37	151
DTR Metering	No.	0	492	403	342	1237
Consumer 1Ph LT Electronic meters	No.	25898	42534	6501	4211	79144
Consumer 3Ph LT Electronic meters	No.	0	430	0	0	430
Roof Top Solar Panel	No.	0	3	3	3	9
AT&C Loss	**%**	**31.24**	**27.38**	**24.75**	**20.30**	
HOUSEHOLD ELECTRIFICATION TARGET						
UN ELECTRIFIED HH	Nos.	6000 (Already Electrified)	14000	1728	0	21728
NEWLY CONSTRUCTED HH	Nos.	279 (Already Electrified)	0	0	0	279
UE VILLAGE ELECTRIFICATION PROGRAMME	Nos.	**16 (Already Electrified)**	**14**	**15**	**0**	**45**
(D) RENEWABLE ENERGY(Already included in Generation under item (A) above)						
Solar	MW	0.00	7.50	12.50	20.00	40.00
Small Hydro Power	MW	0.00	9.50	9.00	7.00	25.50
Total		**0.00**	**17.00**	**21.50**	**27.00**	**65.50**

CHAPTER – 13: SECTOR WISE INVESTMENT PLAN & FUND REQUIREMENT

(in Rs. Cr.)

		Sector	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	Total	Remarks
Generation	State Owned Projects	Projects under Construction	0.00	34.06	13.60	0.00	47.66	
		Projects under R&M	0.00	6.05	4.24	1.00	11.29	
		Future Hydro Electric Projects includes (Tuirini (25MW), Iva (3 MW) and Ngengrual (1MW))	108.17	168.88	168.88	94.92	540.85	
Total Generation			**108.17**	**208.99**	**186.72**	**95.92**	**599.8**	
Transmission	**Intra State**	New GSS	17.12	24.75	27.61	19.60	89.08	
		Augmentation	8.19	12.28	12.28	8.19	40.94	
		Transmission line	118.17	146.25	143.67	95.78	503.87	
	Inter State		37.37	51.99	38.17	25.48	153.01	
Total Transmission			**180.85**	**235.27**	**221.73**	**149.05**	**786.90**	
Distribution								
	IPDS (Future Scheme)							
			0.00	21.32	19.68	8.16	49.16	
	DDUGJY (Future Scheme)							
			0.00	22.93	15.89	11.09	49.91	
Sanctioned Schemes	**RAPDRP Plan**		97.89	142.53	0.00	0.00	240.42	
	REDB Plan		0.00	35.28	24.21	13.88	73.37	This cost excludes Rs. 3.66 Cr. Earmarked for Agency charge.
	DDUGJY Plan		0.00	10.35	10.89	9.04	30.28	
	NEC Plan		2.74	4.12	4.12	2.74	13.72	
	NLCPR Plan		2.74	4.12	4.12	2.74	13.72	
	SPA Plan		0.84	1.27	1.27	0.84	4.22	
Total Distribution			**104.21**	**241.92**	**80.18**	**48.49**	**474.80**	
GRAND TOTAL			**393.23**	**686.18**	**488.63**	**293.46**	**1861.50**	

ANNEXURE-I

GoM Data

Category-wise Growth in consumers

	Consumers	Year-wise 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**
(i)	Domestic	148647	172157	171576	177978	186792	189312
(ii)	Commercial	4690	5107	5596	6417	7537	11985
(iii)	Industrial	589	609	610	634	699	795
(iv)	Public Lighting	3	4	763	579	755	803
(v)	Traction	0	0	0	0	0	0
(vi)	Agriculture	11	16	16	18	19	21
	Public Water Works & Sewage Pumping	25	30	38	45	48	49
(vii)	Miscellaneous	196	206	213	230	349	255
	Total	**154161**	**178129**	**178812**	**185901**	**196199**	**203220**

Note: 1. All the figures are as per State provided Data.

ANNEXURE-II

Census 2011 Data of Households in Mizoram

Description	Rural		Urban		Total	
	No.	**(%)**	**No.**	**(%)**	**No.**	**(%)**
No. of Households in Mizoram	104874	47.44	116203	52.56	221077	100
No. of Electrified Households	72138	38.75	114017	61.25	186155	100
Balance Un-electrified Households	32736	93.74	2186	6.26	34922	100

(Source: Census of India-2011)

ANNEXURE-III

Detailed Calculation of energy Demand in the State of Mizoram up to FY 2018-19

Sl. No.	Particulars→ ↓	Calculation steps		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)		Units	1.42	1.57	1.72	1.89
3	Annual Energy Requirement for existing electrified Rural Household		MU	50.08	55.09	60.60	66.66
4	Consumption of Urban Electrified Households						
5	Consumption (units per day per household)		Units	3.97	4.37	4.80	5.28
6	Annual Energy Requirement for existing urban electrified Household		MU	189.89	208.88	229.77	252.75
7	Total Annual Energy Requirement for existing electrified households(A3+A6)		MU	239.97	263.97	290.37	319.41
B	ADDITIONAL ENERGY REQUIREMENTS FOR ELECTRIFIED DOMESTIC CONSUMERS						
1	**Additional Energy Required for Electrified Households (Annual projection (-) current Energy available MUs)**		**MU**	**21.81**	**45.81**	**72.21**	**101.25**

C	**ELECTRIFICATION OF UNELECTRIFIED HOUSEHOLDS (per year)**					
	URBAN					
1	Unelectrified Household as on 31.03.2015	279 Nos.				
2	Electrification of unelectrified Household	Nos.	279	0	0	0
3	Cumulative Annual Energy Requirement for Electrification of unelectrified urban Household	MU	0.4	0.44	0.49	0.54
	RURAL					
4	Unelectrified Households	21728 Nos.				
5	Targeted Electrification of unelectrified					
6	Electrification of unelectrified Household	Nos.	6000	14000	1728	0
7	Cumulative Annual Energy Requirement for Electrification of unelectrified rural Household	MU	3.12	11.43	13.66	15.02
8	Total households electrified out of unelectrified	Nos.	6279	14000	1728	0
9	**Annual Energy Requirement for Electrification of unelectrified Household**	**MU**	**3.52**	**11.87**	**14.15**	**15.56**

D	ELECTRIFICATION OF NEWLY CONSTRUCTED HOUSEHOLDS (per year)					
	URBAN					
1	Total Household - Urban (nos.) 2015					
	Yearly Increase in Urban H/H	Nos	4724	4894	5070	5253
2	Yearly cumulative Increase in Urban H/H as per GoM	Nos.	4724	9618	14689	19941
3	Cumulative Annual Energy Requirement (MUs) for newly constructed Household - Urban	MU	6.85	15.33	25.76	38.47
	RURAL					
4	Total Household Rural 2014					
5	Yearly Increase in Rural H/H as per GOH	Nos.	3339	3434	3531	3630
6	Yearly cumulative Increase in Rural H/H as per GOM	Nos.	3339	6773	10303	13934
7	Annual Energy Requirement for newly constructed Household	MU	1.73	3.87	6.48	9.63
9	Total newly constructed households	Nos.	8063	8328	8600	8883
10	**Cumulative Annual Energy Requirement for newly constructed Household**	**MU**	8.58	19.20	32.24	48.10

E	ANNUAL ENERGY REQUIREMENTS					
1	Total Additional Annual Energy Requirement - Domestic Consumer	MU	33.91	73.81	118.60	164.91
2	Current Energy Available - Total	MU	327.21	327.21	327.21	327.21
3	Current Energy Available - Domestic	MU	218.16	218.16	218.16	218.16
4	Total Domestic Annual Energy Requirement (Current + Projection)	MU	252.07	295.04	336.76	383.07
5	Current Energy Available - Other than Domestic	MU	109.05	109.05	109.05	109.05
6	Total Annual Energy Requirement - Other than Domestic Consumers (with 11.00% growth P.A.)	MU	121.05	134.37	149.15	165.56
7	Additional Energy Required for other than domestic Categories of Consumers (year wise)	MU	12.00	13.32	14.78	16.41
8	Additional Energy Required for other than domestic (Cumulative)	MU	12.00	25.32	40.10	56.51
9	**Total Energy Requirements (all)**	**Nos.**	**373.12**	**429.41**	**485.91**	**548.63**

Annexure- IV

Breakup & Details of Capacities existing and Likely to be added year wise

Sl. No	Power Source/ Generating Stations	Type (Thermal/ Hydro/ RES)	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)	
A.	**State Generating Station (SGS)**								
A.1	Serlui 'A (1 MW)	RES (MNRE)	Mizoram	1.00	1.00	1.00	1.00	1.00	
A.2	Khawiva (1.05 MW)	RES (MNRE)	Mizoram	1.05	1.05	1.05	1.05	1.05	
A.3	Tuipui (0.50 MW)	RES (MNRE)	Mizoram	0.50	0.50	0.50	0.50	0.50	
A.4	Kau Tlabung (3 MW)	RES (MNRE)	Mizoram	3.00	3.00	3.00	3.00	3.00	Under R&M
A.5	Lamsial (0.50 MW)	RES (MNRE)	Mizoram	0.50	0.50	0.50	0.50	0.50	Under R&M
A.6	Maicham-II (3 MW))	RES (MNRE)	Mizoram	3.00	3.00	3.00	3.00	3.00	
A.7	Serlui'B' (12 MW)	RES (MNRE)	Mizoram	8.00	8.00	12.00	12.00	12.00	
A.8	Tlawva (5 MW)	RES (MNRE)	Mizoram	0.00	0.00	5.00	5.00	5.00	
A.9	Kawlbem (4 MW)	RES (MNRE)	Mizoram	0.00	0.00	0.00	4.00	4.00	
A.10	Tuiriza (0.10 MW)	RES (MNRE)	Mizoram	0.00	0.00	0.10	0.10	0.10	
A.11	Tuiching (0.10 MW)	RES (MNRE)	Mizoram	0.00	0.00	0.10	0.10	0.10	
A.12	Tuirini (25 MW)	Hydro (HEP)	Mizoram	0.00	0.00	0.00	0.00	0.00	Expected COD is beyond 2018-19
A.13	Iva (3 MW)	RES (MNRE)	Mizoram	0.00	0.00	0.00	0.00	3.00	Expected COD is 01 Apr 18

Sl. No	Power Source/ Generating Stations	Type (Thermal/ Hydro/ RES)	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)	
A.14	Ngengrual (1 MW)	RES (MNRE)	Mizoram	0.00	0.00	0.00	0.00	1.00	Expected COD is 01 Apr 18
A.15	Tuirivang (0.3 MW)	RES (MNRE)	Mizoram	0.00	0.00	0.30	0.30	0.30	Under R&M (COD FY 2016-17)
A.16	Tuipanglui (3 MW)	RES (MNRE)	Mizoram	0.00	0.00	0.00	3.00	3.00	Under R&M (COD FY 2017-18)
A.17	Maicham-I (2 MW)	RES (MNRE)	Mizoram	0.00	0.00	0.00	2.00	2.00	Under R&M (COD FY 2017-18)
A.18	Teirei(3 MW)	RES (MNRE)	Mizoram	0.00	0.00	0.00	0.00	3.00	Under R&M (COD FY 2018-19)
A.19	Bairabi Thermal(HFO) (22.92 MW)	Thermal (Diesel)	Mizoram	0.00	0.00	0.00	0.00	0.00	Not in Operation
A.20	Lengpui(Diesel/HSD)(0.5 MW)	Thermal (Diesel)	Mizoram	0.00	0.00	0.00	0.00	0.00	Not in Operation
A.21	DDG Scheme Phase I(5 MW)	RES (MNRE)	Mizoram	0	0.00	2.50	5.00	5.00	
A.22	DDG Scheme Phase II (20 MW)	RES (MNRE)	Mizoram	0	0.00	5.00	15.00	20.00	
A.23	Thenzowl Solar (10 MW)	RES (MNRE)	Mizoram	0	0.00	0.00	0.00	10.00	
A.24	SPV Power Plant (5 MW)	RES (MNRE)	Mizoram	0	0.00	0.00	0.00	5.00	
	Sub Total (SGS)			**17.05**	**17.05**	**34.05**	**55.55**	**82.55**	

Sl. No	Power Source/ Generating Stations	Type (Thermal/ Hydro/ RES)	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)	
B.	**Central Generating Station(Thermal)**								
B.1	Farakka STPS (3X200 MW + 3X500 MW = 2100 MW)	Thermal (Coal)	West Bengal	2.24	2.24	2.24	2.24	2.24	
B.2	Kahalgaon STPS (4X210 MW = 840MW)	Thermal (Coal)	Bihar	1.18	1.18	1.18	1.18	1.18	
B.3	Talcher STPS (6 X 500 MW=3000 MW)	Thermal (Coal)	Odisha	1.40	1.40	1.40	1.40	1.40	
B.4	Bongaigaon (3X250 MW)	Thermal (Coal)	Assam	0.00	0.00	1.20	1.20	1.20	
B.5	Kathalguri(AGBPP) (291 MW)	Thermal (Gas)	Assam	15.74	15.74	15.74	15.74	15.74	
B.6	RC Nagar(AGTPP) (84 MW)	Thermal (Gas)	Assam	5.02	5.02	5.02	5.02	5.02	
B.7	Pallatana(OTPC) (726 MW)	Thermal (Gas)	Tripura	22.00	22.00	22.00	22.00	22.00	
	Sub Total (CGS Thermal)			**47.58**	**47.58**	**48.78**	**48.78**	**48.78**	
C.	**Central Generating Station(Hydro HEP)**								
C.1	Kopili-I HEP (200 MW)	Hydro (HEP)	Assam	9.24	9.24	9.24	9.24	9.24	
C.2	Kopili-II HEP (25 MW)	Hydro (HEP)	Assam	1.51	1.51	1.51	1.51	1.51	

Sl. No	Power Source/ Generating Stations	Type (Thermal/ Hydro/ RES)	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)	
C.3	Khandong HEP (50 MW)	Hydro (HEP)	Assam	1.97	1.97	1.97	1.97	1.97	
C.4	Ranganadi HEP (405 MW)	Hydro (HEP)	Arunachal Pradesh	23.09	23.09	23.09	23.09	23.09	
C.5	Doyang HEP (75 MW)	Hydro (HEP)	Nagaland	3.94	3.94	3.94	3.94	3.94	
C.6	Loktak HEP (105 MW)	Hydro (HEP)	Manipur	5.27	5.27	5.27	5.27	5.27	
C.7	Tuirial (60 MW)	Hydro (HEP)	Mizoram	0.00	0.00	20	40	60	
C.8	Kameng HEP (600 MW)	Hydro (HEP)	Arunachal Pradesh	0.00	0.00	1.50	1.50	1.50	
C.9	Pare HEP (110 MW)	Hydro (HEP)	Arunachal Pradesh	0.00	0.00	4.50	4.50	4.50	
	Sub Total (CGS Hydro)			**45.02**	**45.02**	**71.02**	**91.02**	**111.02**	
D.	**Bi-Lateral Exchange**								
D.1	Baramura GTP-IV	Thermal (Gas)	Tripura	5.25	5.25	5.25	5.25	5.25	Bi-Lateral Exchange
D.2	Baramura GTP-V	Thermal (Gas)	Tripura	5.25	5.25	5.25	5.25	5.25	Bi-Lateral Exchange
	Sub Total (Bi-Lateral)			**10.50**	**10.50**	**10.50**	**10.50**	**10.50**	
	Grand Total			**120.15**	**120.15**	**164.35**	**205.85**	**252.85**	

ANNEXURE-V

LIST OF 132 kV S/STNS in MIZORAM as on 30.11.2015

Sl. No.	Name of Sub station	132/33	132/11	33/11	132/66	66/11	Total installed capacity in MVA
I	**AIZAWL**						
1	Zuangtui (upper)	4x12.5	-	1x0.25	-	-	50.25
2	Luangmual	3x12.5	-	2x6.3	-	-	50.10
II	**KOLASIB**						
3	Bawktlang	2x12.5	-	-	1x12.5	1x6.3	43.80
4	Bairabi	1x3	-	-	-	-	3.00
5	Bairabi Thermal	-	2x15	-	-	-	30.00
III	**LUNGLEI**						
6	Khawiva	2x12.5	-	1x6.3	-	-	31.30
IV	**SERCHHIP**						
7	Bukpui	1x12.5	-	-	-	-	12.50
V	**CHAMPAI**						
8	Keifangtlang	1x12.5	-	-	-	-	12.50
9	Khawzawl	1x12.5	-	1x2.5	-	-	15.00
10	Saitual	1x6.3	-	-	-	-	6.30
	Total Installed Capacity						**254.75**

Existing 132 kV lines as on 30.11.2015

Sl. No.	Name of Line	No. of Ckts.	Length (Ckt Kms)
	132 kV Lines (Intra State)		
1.	Aizawl(PG) Switching Station to Luangmual	S/C	0.80
2.	Bawktlang(Kolasib) to Bairabi	S/C	30.30
3.	Zuangtui to Bukpui	S/C	50.02
4.	Zuangtui to Saitual	S/C	50.00
5.	Saitual to Khawzawl	S/C	43.00
6.	Khawzawl to Keifangtlang (Champhai)	S/C	18.20
7.	Bukpui(Serchhip) to Khawiva (Lunglei)	S/C	69.13
8.	Bukpui(Serchhip) to Thenhlum	S/C	71.38
	Total		**332.83**

ANNEXURE-VI

List of planned Substations FY 2016-17

Sl. No.	Proposed Funding Scheme	District	Name of substation	Capacity Addition (MVA)	Tentative Cost in Rs Cr.
				132/33 kV level	
1.	STATE	Aizawl	Melriat	25	13.41
2.	STATE	Aizawl	New Zuangtui	25	20.77
			Total :	**50**	**34.18**

List of planned Substations FY 2018-19

Sl. No.	Proposed Funding Scheme	District	Name of substation	Capacity Addition (MVA)	Tentative Cost in Rs Cr.
				132/33 kV level	
1.	STATE	Aizawl	Sihhmui	25	32.63
2.	NERPSIP	Lunglei	Lungsen	25	9.5
3.	NERPSIP	Mamit	W. Phaileng	25	14.84
4.	NERPSIP	Mamit	Marpara	25	23.17
5.	NERPSIP	Serchhip	E. Lungdar	12.5	10.72
			Total :	**112.5**	**90.86**

List of planned Substations to undergo Augmentation Works

Sl no.	Proposed Scheme	DISTRICT	Name of GSS	POWER TRANSFORMER CAPACITY					Project Cost in Rs. Cr.
				Voltage Level (kV/kV)	Existing Total Capacity (MVA)	Augmented Total Capacity (MVA)	Capacity Addition (MVA)	% Share of State	
1.	NERSIP	Lunglei	Lunglei	132/33	-	-	25	100.00%	11.27
2.	NERSIP	Kolasib	Kolasib	132/33	-	-	25	100.00%	6.80
3.	NERSIP	Serchhip	Serchhip	132/33	-	-	25	100.00%	11.23
4.	NERSIP	Aizawl	Saitual	132/33	-	-	12.5	100.00%	9.07
5.	NERSIP	Champhai	Khawzawl	132/33	-	-	12.5	100.00%	9.36
							100		**47.73**

List of Planned Transmission Lines FY 2016-17

Sl. No.	Proposed Funding Scheme	Line Section	Line Length (Ckt.Kms)	Tentative Cost Rs in Cr.	Tentative Completion Schedule
		132 kV Lines			
1.	DoNER	Kolasib to Melriat (S/C) on (D/C) Tower	59.09	24.97	2016-17
		Total:	**59.09**	**24.97**	

List of Planned Transmission Lines FY 2018-19

Sl. No.	Proposed Funding Scheme	Line Section	Line Length (Ckt.Kms)	Tentative Cost Rs in Cr.	Tentative Completion Schedule
		400 kV Lines			
1	-	Sakawrtuichhun (PGCIL) to Sihhmui (D/C)	6	9.48	2018-19
		220 kV Lines			
2	-	Tuivai HEP to Sihhmui (D/C)	116	111.10	2018-19
		Total (400 kV & 220 kV Line):		**120.58**	
		132 kV Lines			
3	NEC Retained	Bairabi to W. Phaileng via Mamit (S/C)	74	56.98	2018-19
4	SPA	Luangmual to Sihhmui (D/C)	11.774	12.35	2018-19
5	PGCI	Sakawrtuichhun to Sihhmui (S/C)	14	12.99	2018-19
6	NERSIP (2nd Tranche)	Serchhip to Melriat (S/C)	70	44.19	2018-19
7	NERSIP (2nd Tranche)	LILO of W. Phaileng line at Sihhmui (S/C)	5	3.86	2018-19
8	NERSIP (1st Tranche)	W. Phaileng to Marpara (S/C)	80	51.25	2018-19
9	NERSIP (2nd Tranche)	Marpara to Lungsen (S/C)	145	89.42	2018-19
10	NERSIP (1st Tranche)	Lungsen to Chawngte (S/C)	75	46.91	2018-19
11	NERSIP (1st Tranche)	Chawngte to S. Bungtlang (S/C)	80	48.22	2018-19
12	NERSIP (2nd Tranche)	Lawngtlai to Tuipang (S/C)	70	44.74	2018-19
13	NERSIP (2nd Tranche)	Lungsen to Tlabung (S/C)	30	18.45	2018-19
14	DoNER	Melriat to Khawiva (S/C)	110	49.54	2018-19
		Total (132 kV Line) :		**478.90**	

ANNEXURE-VII-A

Details of POWERGRID Lines in Mizoram

Sl. No.	Name of the Line	Length in ckt km	Voltage Level in kV
1.	Jeribum to Aizawl Switching Station	172	132
2.	Kumarghat to Aizawl Switching Station	133	132
3.	Badarpur to Kolasib	110	132
4.	Kolasib to Aizawl Switching Station	67	132
5.	Aizawl to Zemabawk	7	132
	Total	**489**	

ANNEXURE-VII-B

POWERGRID IN MIZORAM (Existing Transmission line details and Proposed Substations & lines)

A) Existing transmission facilities:

POWERGRID has following transmission system in Mizoram:

132 kV transmission lines	:	About 489 CKm
132 kV Switching Substations	:	1 No. at Aizawl

B) Ongoing/Proposed Schemes

POWERGRID has undertaken/planned following transmission work in Mizoram to strengthen the connectivity of Mizoram State Grid with National Grid.

Major work are:

- Silchar to Melriat New 400 kV D/C Line at 132 kV – 286 CKm
- Melriat (New) to Sihhmui 132 kV D/C Line – 12 CKm.
- LILO of one Circuit of Aizawl – Zemabawk 132 kV D/C Line at Melriat (New) – 30 CKm.

The date of commissioning of the above work is June 2016.

C) Issues

Priority	Transmission Line	Substation
1		Establishment of New sub-station at Lungsen with 132/33 kV, 2x12.5 MVA transformer (This requires charging of Lunglei – Lungsen line at 132 kV. For this, one 132 kV bay at Lungsen would be constructed under this scheme)
2		Augmentation of Lunglei sub-station by addition of 4x8.33 MVA single phase (25MVA) 132/33kV transformer (one 132 kV bay at Lunglei for charging of Lunglei – Lungsen line at 132 kV would be constructed under this scheme)
3	Lungsen – Chawngte 132 kV S/c (charged at 33 kV)	
4	Chawngte – S. Bungtlang 132 kV S/c line via S. Diltlang (charged at 33 kV)	
5		Establishment of New sub-station at W. Phaileng with

Priority	Transmission Line	Substation
		132/33 kV, 2x12.5 MVA transformer (This requires charging of Zemabawk – W. Phaileng line at 132 kV. For this, 132 kV bay at Zemabawk would be constructed by Govt. of Mizoram whereas 132 kV bays at Phaileng will be constructed under this scheme). Govt. of Mizoram need to construct 132 kV bay at Zemabawk in matching time-frame.
6	W. Phaileng – Marpara 132 kV S/c on D/c alongwith new 2x12.5 MVA sub-station at Marpara	

ANNEXURE-VIII – A

DISTRICT WISE OVERALL PLAN AND FUND REQUIREMENT AGAINST ONGOING PROJECTS UNDER R-APDRP IN 09 DISTRICTS OF MIZORAM

Sl. No.	Item of Work	Unit	Aizawl		Lunglei		Saiha		Kolasib		Champhai	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
A.	**Feeder Separation**											
1	33 KV Feeder	Km	28.56	1797.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Distribution Transformer	Nos.	61.00	817.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MVA	16.50		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub-Total			**2615.02**		**0.00**		**0.00**		**0.00**		**0.00**
B.	**Strengthening of Sub-Transmission and Distribution Network**											
1	33/11 KV SS :											
	(a)New substation	MVA	25.20	1608.62	7.50	989.80	0.00	0.00	0.00	0.00	0.00	0.00
	(d)Additional Bay/Bay Extension	LS	0.00	0.00	2.00	81.94	0.00	0.00	0.00	0.00	0.00	0.00
2	R&M of 33/11kV SS	LS	8.00	2755.80	0.00	0.00	0.00	0.00	0.00	0.00	7.00	129.95
3	33 KV Line/Feeders											
	(a)New/Bifurcation	Km	17.00	1070.15	4.00	164.88	2.00	82.42	0.00	0.00	0.00	0.00
	(b)Augmentation/Reconductoring	Km	4.00	21.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	11 KV Line/Feeders											
4.1	New/Bifurcation											
	a)By Aerial Bunched Cable	Km	27.78	297.52	1.00	10.72	1.05	44.81	7.13	304.10	1.29	55.06
	b)By Bare Conductor	Km	0.00	0.00	0.00	0.00	1.70	18.21	1.00	10.72	5.00	53.60
4.2	Augmentation/Reconductoring											
	a)By Aerial Bunched Cable	Km	21.27	76.36	1.00	38.02	0.00	0.00	0.00	0.00	0.00	0.00
	b)By Bare Conductor	Km	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sl. No.	Item of Work	Unit	Aizawl		Lunglei		Saiha		Kolasib		Champhai	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
5	Distribution Transformer											
	(a)New Installation	MVA	12.143	1138.66	0.41	32.47	1.30	138.32	2.13	203.76	1.45	160.24
	(b)R&M/Improvement	Nos	318.00	1049.68	20.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00
6	LT Line/Feeders											
6.1	New/Bifurcation											
	(a)By Aerial Bunched Cable	Km	31.45	318.90	0.00	0.00	8.60	252.58	0.00	0.00	0.00	0.00
	(b)By Bare Conductor	Km	0.00	0.00	1.00	10.14	3.10	31.43	4.00	40.56	8.80	89.14
6.2	Augmentation/Reconductoring											
	(a)By Aerial Bunched Cable	Km	8.70	37.93	5.00	94.70	1.00	29.37	12.96	311.82	13.86	407.07
	(b)By Bare Conductor	Km	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Trolley Based Mobile DT	Nos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	14.62
8	Aerial Bunched Cables	Km	90.48	2303.64	1.00	42.68						
	Sub-Total			**10678.46**		**1466.19**		**597.15**		**870.95**		**909.68**
C.	**Metering**											
1	Consumer	Nos	29585.00	2390.54	2219.00	314.87	4875.00	259.70	4736.00	242.34	2334.00	141.57
2	Others											
	(a) Improvement of Existing Service Connection		0.00	0.00	0.00	0.00	106.00	224.46	2983.00	152.71	2748.00	141.76
	(b) Testing Bench/Kit		0.00	0.00	2.00	40.97	0.00	0.00	0.00	0.00	0.00	0.00
	Sub-Total			**2390.54**		**355.84**		**484.16**		**395.05**		**283.33**
	Grand Total			**15684.02**		**1822.03**		**1081.31**		**1266.00**		**1193.01**

Contd…

Sl. No.	Item of Work	Unit	Serchhip		Lawngtlai		Saitual		Khawzawl		Total	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
A.	**Feeder Separation**											
1	33 KV Feeder	Km	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.56	1797.63
2	Distribution Transformer	Nos.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.00	817.39
		MVA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.50	0.00
	Sub-Total			**0.00**		**0.00**		**0.00**		**0.00**	**106.06**	**2615.02**
B.	**Strengthening of Sub-Transmission and Distribution Network**											
1	33/11 KV SS :											
	(a)New substation	MVA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.70	2598.42
	(d)Additional Bay/Bay Extension	LS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	81.94
2	R&M of 33/11kV SS	LS	0.00	0.00	0.00	0.00	105.00	144.55	2.00	50.14	122.00	3080.44
3	33 KV Line/Feeders											
	(a)New/Bifurcation	Km	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.00	1317.45
	(b)Augmentation/Reconductoring	Km	0.00	0.00	3.00	123.57	0.00	0.00	0.00	0.00	7.00	144.77
4	11 KV Line/Feeders											
4.1	New/Bifurcation											
	a)By Aerial Bunched Cable	Km	1.75	74.66	0.00	0.00	1.00	42.68	2.20	93.92	42.15	923.46
	b)By Bare Conductor	Km	4.50	48.24	1.60	17.15	3.10	33.23	2.35	25.19	17.55	206.35
4.2	Augmentation/Reconductoring											
	a)By Aerial Bunched Cable	Km	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.27	114.38
	b)By Bare Conductor	Km	4.50	16.11	0.00	0.00	10.20	65.89	0.00	0.00	14.70	82.00
5	Distribution Transformer											
	(a)New Installation	MVA	1.05	90.93	1.46	160.73	1.83	76.14	0.38	47.22	20.85	2048.47
	(b)R&M/Improvement	Nos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	338.00	1050.52

Sl. No.	Item of Work	Unit	Serchhip		Lawngtlai		Saitual		Khawzawl		Total	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
6	LT Line/Feeders											
6.1	New/Bifurcation											
	(a)By Aerial Bunched Cable	Km	0.00	0.00	4.00	117.40	0.00	0.00	0.00	0.00	35.45	688.88
	(b)By Bare Conductor	Km	8.00	81.04	7.25	150.40	2.40	24.34	3.75	38.03	35.20	465.08
6.2	Augmentation/Reconductoring											
	(a)By Aerial Bunched Cable	Km	12.50	366.88	0.00	0.00	4.10	98.65	5.15	123.91	62.27	1470.32
	(b)By Bare Conductor	Km	0.00	0.00	2.00	58.70	6.20	60.19	0.00	0.00	8.20	118.89
7	Trolley Based Mobile DT	Nos	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	14.62
8	Aerial Bunched Cables	Km									91.48	2346.32
	Sub-Total			**677.85**		**627.95**		**545.67**		**378.40**	**874.81**	**16752.31**
C.	**Metering**											
1	Consumer	Nos	3401.00	178.09	2944.00	148.78	2435.00	118.59	1494.00	74.70	49148.00	3869.19
2	Others											
	(a) Improvement of Existing Service Connection		26.00	31.22	65.00	155.30	941.00	45.77	300.00	12.90	7063.00	764.11
	(b) Testing Bench/Kit		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	40.97
	Sub-Total			**209.31**		**304.08**		**164.36**		**87.60**	**56213.00**	**4674.27**
	Grand Total			**887.16**		**932.04**		**710.03**		**466.00**		**24041.60**

ANNEXURE-VIII - B

DISTRICT WISE OVERALL PLAN AND FUND REQUIREMENT AGAINST ONGOING PROJECTS UNDER REDB SCHEME IN 08 DISTRICTS OF MIZORAM

Sl. No.	Item of Work	Unit	Aizawl		Lunglei		Saiha		Kolasib		Champhai		serchhip		Lawngtlai		Mamit		Total	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
A.	**Strengthening of Sub-Transmission and Distribution Network**																			
1	33/11 KV or 66/11 KV SS :																			
	New substation	MVA	0	0.00	2	628.22	4.1	640.68			1.6	314.11	1.6	314.11	0.00	0.00	0	0.00	9.30	1897.12
	Augmentation/ Enhancement	MVA	2.5	191.97	3.2	367.79	1.6	183.90	5.7	559.76	1.6	183.90	2.5	191.97	0.00	0.00	5.7	559.76	22.80	2239.05
	Additional Bay	LS			2	75.18	2	75.18			1	37.59	1	37.59	0.00	0.00	0.00	0.00	6.00	225.53
	Sub-Total:		**3**	**191.97**	**7.2**	**1071.19**	**7.7**	**899.75**	**5.7**	**559.76**	**4.2**	**535.60**	**5.1**	**543.67**	**0.00**	**0.00**	**5.70**	**559.76**	**38.10**	**4361.71**
2	33 KV feeders																			
	New	Km	0.00	0.00	58	650.99	80	897.92	0.00	0.00	27	303.05	24	269.37	0.00	0.00	0.00	0.00	189.00	2121.33
	Sub-Total:		**0.00**	**0.00**	**58**	**650.99**	**80**	**897.92**	**0.00**	**0.00**	**27**	**303.05**	**24**	**269.37**	**0**	**0.00**	**0**	**0.00**	**189**	**2121.33**
3	11 KV feeders-																			
	New	Km	0.00	0.00	0.00	0.00	0	0.00	0.0	0.00	0	0.00	0	0.00	60.63	604.45	25	249.24	85.63	853.69
	Sub-Total:		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.0**	**0.00**	**0**	**0.00**	**0.00**	**0.00**	**60.63**	**604.45**	**25**	**249.24**	**85.63**	**853.69**
	Grand Total			**191.97**		**1722.18**		**1797.67**		**559.76**		**838.64**		**813.04**		**604.45**		**809.00**		**7336.73**

ANNEXURE-VIII - C

DISTRICT WISE OVERALL PLAN AND FUND REQUIREMENT AGAINST ONGOING PROJECTS UNDER DDUGJY IN 08 DISTRICTS OF MIZORAM

Sl. No.	Item of Work	Unit	Aizawl		Lunglei		Saiha		Kolasib		Champhai		serchhip		Lawngtlai		Mamit		Total	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
1	11 KV feeders-																			
	New	Km	16.85	1.549	34.40	3.224	4.5	0.433	13.1	1.21	7.1	0.666	10.25	0.95	34.50	3.328	87.5	8.20	208.20	19.56
	Sub-Total:		16.85	1.55	34.40	3.224	4.50	0.43	13.1	1.21	7.1	0.67	10.25	0.95	34.50	3.33	87.5	8.20	208.20	19.56
2	Distribution Transformer-New																			
	(a) 63kVA Distribution Transformer	No.	1.000	0.055							1.000	0.056							2	0.11
	(b) 100kVA Distribution Transformer	No.											3.000	0.197					3	0.20
	(c) 25kVA Distribution Transformer	No.	6.000	0.281	11.000	0.520	9.000	0.431	4.000	0.187	2.000	0.095	1.000	0.047	13.000	0.623	26.000	1.23	72	3.41
	Sub-Total:		7.000	0.336	11	0.520	9	0.431	4.000	0.19	3	0.150	4.000	0.244	13	0.62	26	1.23	77	3.72
3	LT Line : New Feeder/ Feeder Bifurcation																			
	(a) New LT Line(Gnat&Ant) 3-Ph 4 wire	Kms	6.80	0.634	5.80	0.554	7.00	0.691	3.00	0.281	4.00	0.348	1.50	0.142	15.00	1.485	27.1	2.59	70.20	6.72
	Sub-Total:		6.80	0.63	5.80	0.55	7.00	0.69	3.00	0.28	4.00	0.35	1.50	0.14	15.00	1.48	27.1	2.59	70.20	6.72
4	Provisioning of Connection to																			
	BPL HH	No.	93	0.028	140	0.042	49	0.015	61	0.018	76	0.023	3	0.001	52	0.016	459	0.14	933	0.28
	Sub-Total:		93	0.028	140	0.042	49	0.015	61	0.018	76	0.02	3	0.001	52	0.02		0.14	933	0.28
	Grand Total		**123.65**	**2.55**	**191.20**	**4.34**	**69.50**	**1.57**	**81.10**	**1.69**	**90.10**	**1.19**	**18.75**	**1.34**	**114.50**	**5.45**	**140.60**	**12.15**	**1288.40**	**30.28**

ANNEXURE-VIII - D

DISTRICT WISE OVERALL PLAN AND FUND REQUIREMENT AGAINST ONGOING PROJECTS UNDER NEC FUNDING IN 02 DISTRICTS OF MIZORAM

Sl. No.	Item of Work	Unit	Kolasib		Lunglei	
			Qty	Amt.	Qty	Amt.
1	**33/11 KV SS :**					
	New substation	No.	1	685	1	685
	Grand Total			**685.00**		**685.00**

DISTRICT WISE OVERALL PLAN AND FUND REQUIREMENT AGAINST ONGOING PROJECTS UNDER NLCPR FUNDING IN 02 DISTRICTS OF MIZORAM

Sl. No.	Item of Work	Unit	Lwangtlai & Saiha	
			Qty	Amt.
1	**33/11 KV SS :**			
	New substation	No.	3	1372
	Grand Total			**1372.00**

DISTRICT WISE OVERALL PLAN AND FUND REQUIREMENT AGAINST ONGOING PROJECTS UNDER SPA FUNDING IN 01 DISTRICT OF MIZORAM

Sl. No.	Item of Work	Unit	Lunglei	
			Qty	Amt.
1	**33/11 KV SS :**			
	New substation	No.	1	422
	Grand Total			**422.00**

ANNEXURE-IX -A

DISTRICT WISE OVERALL PLAN AND FUND REQUIREMENT AGAINST FUTURE PROJECTS UNDER IPDS SCHEME IN 06 TOWNS OF MIZORAM

Sl. No.	Item of Work	Unit	Mamit		Thenzawl		Kawnpui		Vairengte		Hnahthial		Khawhai		Total	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
A.	**Feeder Separation**															
	(a) R&M of Distribution Transformer 100kVA	Nos.	3	13.38	7	31.22	1	4.46	2	8.92	3	13.38	1	4.46	17	75.82
	(b) Replacement of LT Poles(Due to Rusting)	Nos	50	12.00	26	6.24	54	12.96	20	4.80	30	7.20	10	2.40	190	45.6
	Sub-Total			**25.38**		**37.46**		**17.42**		**13.72**		**20.58**		**6.86**		**121.42**
B.	**Strengthening of Sub-Transmission and Distribution Network**															
1	33/11 KV or 66/11 KV SS :	MVA														
	New substation	No.	1	563.02											1	563.02
	Sub-Total:		**1**	**563.02**											**1**	**563.02**
2	Brief Scope of R&M works in existing 33/11 KV or 66/11 KV substations	Lot					Lot	27.89	Lot	71.98	Lot	24.93				124.81
	Sub-Total:							**27.89**		**71.98**		**24.93**				**124.81**
3	33 KV feeders															
	New	Km											36	512.14	36	512.14
	Augmentation	Lot	Lot	103.92			Lot	38.88			Lot	75.16				217.96
	Sub-Total:			**103.92**				**38.88**				**75.16**	**36**	**512.14**	**36**	**730.10**
4	11 KV feeders-															
	New	Km	43.40	441.81	2.80	28.50	0.45	4.58	3.0	30.54	2.50	25.45	1.50	15.27	53.65	546.15
	Augmentation	Km					Lot	12.99	Lot	14.99						27.98
	Sub-Total:		**43.40**	**441.81**	**2.80**	**28.50**	**0.45**	**17.57**	**3.0**	**45.53**	**2.50**	**25.45**	**1.50**	**15.27**	**33.65**	**574.13**
5	Distribution Transformer-New															
	(a) 63kVA Distribution Transformer	Nos			3.00	16.23			1	5.41					4	21.64
	(b) 100kVA Distribution Transformer	Nos	5	38.60	1	7.72	2	15.44	2	15.44	2	15.44	1	7.72	13	100.36
	(c) 250kVA Distribution Transformer	Nos	4	49.08	1	12.27	1	12.27	1	12.27	1	12.27	0	0.00	8	98.16
	Sub-Total:		**9**	**87.68**	**5**	**36.22**	**3**	**27.71**	**4**	**33.12**	**3**	**27.71**	**1**	**7.72**	**25**	**220.16**

Sl. No.	Item of Work	Unit	Mamit		Thenzawl		Kawnpui		Vairengte		Hnahthial		Khawhai		Total	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
6	Distribution Transformer-R&M/Augmentation															
	(a) Augmentation by 100 kVA	Nos			2	13.08	3	19.62			1	6.54			6	39.24
	(b) Augmentation by 250 kVA	Nos	2	22.18											2	22.18
	Sub-Total:		**2**	**22.18**	**2**	**13.08**	**3**	**19.62**			**1**	**6.54**			**8**	**61.42**
7	LT Line : New Feeder/ Feeder Bifurcation															
	(a) New LT Line(Gnat & Ant) 3-Ph 5 wire	Kms	14.00	143.50	6.80	69.70	5.70	58.43	6.00	61.50	1.50	15.38	2.00	20.50	36.00	369.00
	(b) New LT Line(Gnat & Grasshopper) 3-Ph 5 wire	Kms	14.15	157.35	7.00	77.84			6.00	66.72	5.50	61.16			32.65	363.07
	(c) LT Line Bifurcation (Using ABC 70 sq mm)	Kms			0.15	2.11	1.50	21.11	1.50	21.11	1.50	21.11			4.65	65.43
	(d) LT Line Bifurcation (Using ABC 95 sq mm)	Kms			0.46	6.56			1.50	21.38	1.25	17.81			4.40	45.74
	(e) LT Line Bifurcation (Using ABC 120 sq mm)	Kms			0.72	10.71			1.50	22.31	1.25	18.59			3.21	51.60
	Sub-Total:		**28.15**	**300.85**	**15.13**	**166.91**	**7.20**	**79.53**	**16.50**	**193.01**	**11.00**	**134.04**	**2.00**	**20.50**	**80.91**	**894.83**
8	**LT Line : Augmentation/ Reconductoring**															
	(a) Conversion of 3-wire into 5-wire	Kms	0.50	0.80	4.00	6.36	5.60	8.90	5.00	7.95	1.50	2.39			16.60	26.39
	(b) Reconductoring using Grasshopper	Kms	3.00	13.08	2.56	11.16	3.00	13.08	5.00	21.80	2.00	8.72			15.56	67.84
	(c) Reconductoring using ABC 70 SQ mm	Kms			0.77	13.34			2.00	34.66	2.00	34.66			4.77	82.66
	(d) Reconductoring using ABC 95 SQ mm	Kms	1.50	26.27	1.17	20.49			1.50	26.27	1.50	26.27			5.67	99.28
	(e) Reconductoring using ABC 120 SQ mm	Kms	2.50	45.33	1.20	21.76									3.70	67.08
	Sub-Total:		**7.50**	**85.47**	**9.70**	**73.11**	**8.60**	**21.98**	**13.50**	**90.68**	**7.00**	**72.03**			**46.30**	**343.26**
9	Provisioning of solar panel															
	Location 1 100 /(Capacity)	KWp	1	0.7	5	3.5	1	0.7	1	0.7	1	0.7			9	6.30
	Sub-Total:		**1**	**0.7**	**5**	**3.5**	**1**	**0.7**	**1**	**0.7**	**1**	**0.7**			**9**	**6.30**

Sl. No.	Item of Work	Unit	Mamit		Thenzawl		Kawnpui		Vairengte		Hnahthial		Khawhai		Total	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
10	Aerial Bunched Cables															
	(a) 11kV 3x95Sqmm ABC New line	Kms	12.5	418.88											12.5	418.88
	(b) New LT line by ABC 70 sqmm	Kms	3.27	79.79	3.27	79.79	3.27	79.79	3.27	79.79	0.50	12.20	3.27	79.79	16.85	411.14
	(c) New LT line by ABC 95 sqmm	Kms			1.00	24.58					1.00	24.58			2.00	49.16
	(d) New LT line by ABC 120 sqmm	Kms			3.00	75.60					1.50	37.80			4.50	113.40
	Sub-Total		**15.77**	**498.65**	**7.27**	**179.97**	**3.27**	**79.79**	**3.27**	**79.79**	**3.00**	**74.58**	**3.27**	**79.79**	**35.85**	**992.58**
C.	**Metering**															
1	Feeder/Boundary meters	Nos	3	2.19	3	2.19	3	2.19	3	2.19	3	2.19	2	1.46	17	12.41
2	Distribution Transformer	Nos	8	9.84	8	9.84	8	9.84	8	9.84	8	9.84	5	6.15	45	55.35
3	Consumer															
	i) 1-Phase	Nos	800	40	620	31	450	22.5	620	31	620	31	260	13	3370	168.50
	ii) 3-Phase	Nos	100	11	80	8.8	50	5.5	80	8.8	80	8.8	40	4.4	430	47.30
	Sub-Total		**911**	**63.03**	**711**	**51.83**	**511**	**40.03**	**711**	**51.83**	**711**	**51.83**	**307**	**25.01**	**3862**	**283.56**
	Grand Total			**2192.69**		**590.58**		**371.12**		**580.35**		**513.55**		**667.29**		**4915.58**

ANNEXURE-IX –B

DISTRICT WISE OVERALL PLAN AND FUND REQUIREMENT AGAINST FUTURE PROJECTS UNDER DDUGJY SCHEME (DISTRIBUTION SYSTEM STRENGTHENING) IN 08 DISTRICTS OF MIZORAM

Sl. No.	Item of Work	Unit	Aizawl		Lunglei		Saiha		Kolasib		Champhai		serchhip		Lawngtlai		Mamit		Total	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
A.	**Feeder Separation**																			
2	11 KV Feeder	Km	0	0	0	0	0	0	16.5	152.09	15	140.70	0	0	0	0	2	18.74	33.5	311.54
3	LT Line	Km	0	0	0	0	0	0	10	93.54	9.5	82.65	0	0	0	0	2	19.10	21.5	195.28
4	Distribution Transformer	MVA	0	0	0	0	0	0	0.15	28.12	0.275	51.99	0	0	0	0	0.025	4.72	0.45	84.82
	Sub-Total			**0**		**0**		**0**		**273.75**		**275.33**		**0.00**		**0.00**		**42.56**		**591.64**
B.	**Strengthening of Sub-Transmission and Distribution Network**																			
1	33/11 KV or 66/11 KV SS:	MVA																		
	New substation	No.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	314.11	1.00	314.11
	Augmentation/ Enhancement	No.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	5.00	220.56
	Sub-Total:		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	314.11	6.00	534.67
2	Brief Scope of R&M works in existing 33/11 KV or 66/11 KV substations	Lot					Lot				5	220.56	2.00	151.91			2.00	78.69		1069.34
	Sub-Total:							0.00		0.00	5.00	220.56	2.00	151.91			2.00	78.69		451.16
3	33 KV feeders																			
	New	Km									4	85.28							4.00	85.28
	Augmentation	Lot							92.60	144.00									92.60	144.00
	Sub-Total:			0.00				0.00	92.60	144.00	4.00	85.28	0	0.00	0	0.00		0.00	97	229.28
4	11 KV feeders-																			
	New	Km	49.00	450.43	48.00	449.87	8.5	81.82			4	37.52	4	37.13	27.50	265.25	1	9.37	142.00	1331.39
	Sub-Total:			**450.43**		**449.87**		**81.82**		**0.00**		**37.52**		**37.13**		**265.25**		**9.37**		**1331.39**
5	Distribution Transformer-R&M/Augmentation																			
	(a) Augmentation by 63 kVA	Nos			1	5.59					1	5.59	2.00	11.13			2.00	11.181		
	(b) Augmentation by 100 kVA	Nos			1	7					1	6.59	1.00	6.56	2	13.36	3.00	19.772	8	52.88

Sl. No.	Item of Work	Unit	Aizawl		Lunglei		Saiha		Kolasib		Champhai		serchhip		Lawngtlai		Mamit		Total	
			Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.	Qty	Amt.
	(c) Augmentation by 250 kVA	Nos			2	12					3	32.63	2.00	21.66			2.00	21.746	9	88.22
	Sub-Total:		0	0.00	4	24.36	0	0.00			5	44.82	5	39.35	2.00	13.36	7	52.70	17	141.09
C.	**Metering**																			
1	Feeder/Boundary meters	Nos	19	17.79	22	20.06	4	3.68	15	13.84	30	28.23	10	9.41	12	10.91	20	18.96	132	122.88
2	Distribution Transformer	Nos	280	195.95	179	124.95	61	42.98	88	62.42	255	177.07	66	47.32	97	67.20	164	113.12	1190	831.02
3	Consumer		2280	115.14	2002	101.10	2767	139.73	2947	148.82	2507	126.60	1942	98.07	2028	102.41	2239	113.07	18712	944.96
	Sub-Total			**328.88**		**246.11**		**186.40**		**225.08**		**331.91**		**154.79**		**180.53**		**245.15**		**1898.85**
	Grand Total			**779.31**		**720.33**		**268.22**		**642.83**		**995.42**		**383.19**		**459.14**		**742.58**		**4991.02**

ANNEXURE-IX -C

THE SUMMARY OF OVERALL PLAN AGAINST FUTURE PROJECTS

Sl. No.	Item of Work	Unit	Total	
			Qty	Amt.
A.	**Feeder Separation**			
	11 kV Feeder	Km	33.5	311.54
	LT Line	Km	21.5	195.28
	Distribution transformer	MVA	0.45	84.82
1	**Distribution Transformer**			
	(a) R&M of Distribution Transformer 63kVA	Nos.	12	32.76
	(b) R&M of Distribution Transformer 100kVA	Nos.	17	75.82
	(c) R&M of Distribution Transformer 250 kVA	Nos.	20	173.4
	(d) Replacement of LT Poles(Due to Rusting)	Nos	190	45.6
B.	**Strengthening of Sub-Transmission and Distribution Network**			
1	**33/11 KV or 66/11 KV SS :**	MVA		
	New Substation	No.	2	877.13
	Augmentation/Enhancement	No.	5	220.56
2	**Brief Scope of R&M works in existing 33/11 KV or 66/11 KV substations**	Lot		1194.15
3	**33 KV feeders**			
	New	Km	40	597.42
	Augmentation	Lot		361.96
4	**11 KV feeders-**			
	New	Km	175.65	1673.94
	Augmentation	Km		27.98
5	**Distribution Transformer-New**			
	(a) 63kVA Distribution Transformer	*Nos*	4	21.64
	(b) 100kVA Distribution Transformer	Nos	13	100.36
	(c) 250kVA Distribution Transformer	Nos	8	98.16
6	**Distribution Transformer-R&M/Augmentation**			
	(a) Augmentation by 63 kVA	Nos.	4	33.49
	(a) Augmentation by 100 kVA	Nos	14	92.12
	(b) Augmentation by 250 kVA	Nos	11	110.4

Sl. No.	Item of Work	Unit	Total	
			Qty	Amt.
7	**LT Line : New Feeder/ Feeder Bifurcation**			
	(a) New LT Line(Gnat & Ant) 3-Ph 5 wire	Kms	36.00	369.00
	(b) New LT Line(Gnat & Grasshopper) 3-Ph 5 wire	Kms	32.65	363.07
	(c) LT Line Bifurcation (Using ABC 70 sqmm)	Kms	4.65	65.43
	(d) LT Line Bifurcation (Using ABC 95 sqmm)	Kms	4.40	45.74
	(e) LT Line Bifurcation (Using ABC 120 sqmm)	Kms	3.21	51.60
8	**LT Line : Augmentation/Reconductoring**			
	(a) Conversion of 3-wire into 5-wire	Kms	16.60	26.39
	(b) Reconductoring using Grasshopper	Kms	15.56	67.84
	(c) Reconductoring using ABC 70 SQ mm	Kms	4.77	82.66
	(d) Reconductoring using ABC 95 SQ mm	Kms	5.67	99.28
	(e) Reconductoring using ABC 120 SQ mm	Kms	3.70	67.08
9	**Provisioning of solar panel**			
	Location 1 100 /(Capacity)	KWp	5	302.95
	Location 2 70/(Capacity)	KWp	1	42.41
10	**Aerial Bunched Cables**			
	(a) 11kV 3x95Sqmm ABC New line	Kms	8.27	277.04
	(b) New LT line by ABC 70 sqmm	Kms	16.85	411.14
	(c) New LT line by ABC 95 sqmm	Kms	2.00	49.16
	(d) New LT line by ABC 120 sqmm	Kms	4.50	113.40
C.	**Metering**			
1	Feeder/Boundary meters	Nos	149	135.29
2	Distribution Transformer	Nos	1235	886.37
3	Consumer			
	i) 1-Phase	Nos	22082	1113.46
	ii) 3-Phase	Nos	430	47.30
	Grand Total			**10106.39**

ANNEXURE-X

YEARWISE PROPOSED INFRASTRUCTURE PLAN FOR ALREADY SANCTIONED RAPDRP PROJECT

Sl. No.	Item of Work	Unit	Aizawl	Year wise rollout plan			Lunglei	Year wise rollout plan			Saiha	Year wise rollout plan			Kolasib	Year wise rollout plan		
			Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2017-18	Qty	2015-16	2016-17	2017-18
A.	**Feeder Separation**																	
1	**33 KV Feeder**	Km	28.56	10.00	18.56													
2	Distribution Transformer	Nos.	61.00	20.00	41.00													
B.	**Strengthening of Sub-Transmission and Distribution Network**																	
1	**33/11 KV SS :**																	
	(a)New substation	MVA	25.2	7.83	17.37		7.5	3	4.5									
	(b)Additional Bay/Bay Extension	LS					2.00	1.00	1.00									
	(c) Augmentation	No.																
2	**R&M of 33/11kV SS:**	LS	8.00	4.00	4.00													
3	**33 KV Line/Feeders**																	
	(a)New/Bifurcation	Km	17.00	6	11		4.00	2.00	2.00		2.00	1.00	1.00					
	(b)Augmentation/ Reconductoring	Km	4.00	2.00	2.00													
4	**11 KV Line/Feeders**																	
4.1	**New/Bifurcation**																	
	a)By Aerial Bunched Cable	Km	27.78	10.00	17.78		1.00	0.45	0.55		1.05	0.7	0.35		7.13	4.70	2.43	
	b)By Bare Conductor	Km									1.70	0.93	0.77		1.00	0.45	0.55	
4.2	**Augmentation/ Reconductoring**																	

Sl. No.	Item of Work	Unit	Aizawl	Year wise rollout plan			Lunglei	Year wise rollout plan			Saiha	Year wise rollout plan			Kolasib	Year wise rollout plan		
			Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2017-18	Qty	2015-16	2016-17	2017-18
	a)By Aerial Bunched Cable	Km	21.27	7.27	14.00		1.00	0.35	0.65									
	b)By Bare Conductor	Km																
5	**Distribution Transformer**																	
	(a)New Installation	MVA	12.14	5.49	6.65		0.41	0.25	0.16		1.3	0.94	0.36		2.13	1.57	0.56	
	(b)R&M/Improvement	Nos	318.00	118	200		20	8	12									
6	**LT Line/Feeders**																	
6.1	**New/Bifurcation**																	
	(a)By Aerial Bunched Cable	Km	31.45	11.45	20.00						8.60	5.16	3.44					
	(b)By Bare Conductor	Km					1	1			3.10	1.48	1.62		4.00	2.00	2.00	
6.2	**Augmentation/ Reconductoring**						5.00		5.00									
	(a)By Aerial Bunched Cable	Km	8.70	3	5.7		5	2	3		1.00	1.00			12.96	4.16	8.8	
	(b)By Bare Conductor	Km																
7	**Trolley Based Mobile DT**	Nos																
8	Aerial Bunched Cables	Km	90.48	30.48	60.00		1.00	1.00										
C.	**Metering**																	
1	Feeder	Nos																
2	Consumer	Nos	29585.00	10000	19585		2219.00	888	1331		4875	2812	2063		4736	2368	2368	
3	**Others**																	
	(a) Improvement of Existing Service Connection										106	48	58		2983	1367	1616	
	(b) Testing bench/kit	Nos.					2	1	1									

Contd…

Sl. No.	Item of Work	Unit	Champhai	Yearwise Roll out Plan			Serchhip	Yearwise Roll out Plan			Lawngtlai	Yearwise Roll out Plan			Saitual	Yearwise Roll out Plan		
			Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2018-19
A.	**Feeder Separation**																	
1	**33 KV Feeder**	Km																
2	Distribution Transformer	Nos																
B.	**Strengthening of Sub-Transmission and Distribution Network**																	
1	**33/11 KV SS :**																	
	(a)New substation	MVA																
	(b)Additional Bay/Bay Extension	LS																
	(c) Augmentation	No.																
2	**R&M of 33/11kV SS:**	LS	7	4	3										105	38	67	
3	**33 KV Line/Feeders**																	
	(a)New/Bifurcation	Km																
	(b)Augmentation/ Reconductoring	Km									3	1.34	1.66					
4	**11 KV Line/Feeders**																	
4.1	**New/Bifurcation**																	
	a)By Aerial Bunched Cable	Km	1.29	0.54	0.75		1.75	0.8	0.95						1	0.4	0.6	
	b)By Bare Conductor	Km	5	1.86	3.14		4.5	1.95	2.55		1.6	0.77	0.83		3.1	1.12	1.98	
4.2	**Augmentation/ Reconductoring**																	
	a)By Aerial Bunched Cable	Km																

Sl. No.	Item of Work	Unit	Champhai	Yearwise Roll out Plan			Serchhip	Yearwise Roll out Plan			Lawngtlai	Yearwise Roll out Plan			Saitual	Yearwise Roll out Plan		
			Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2018-19	Qty	2015-16	2016-17	2018-19
	b)By Bare Conductor	Km					4.5	2	2.5						10.2	5	5.2	
5	**Distribution Transformer**																	
	(a)New Installation	MVA	1.45	0.69	0.76		1.05	0.48	0.57		1.46	0.68	0.78		1.83	0.6	1.23	
	(b)R&M/Improvement	Nos																
6	**LT Line/Feeders**																	
6.1	**New/Bifurcation**																	
	(a)By Aerial Bunched Cable	Km									4	1.87	2.13					
	(b)By Bare Conductor	Km	8.8	3.4	5.4		8	3.45	4.55		7.25	2.7	4.55		2.4	1.08	1.32	
6.2	**Augmentation/ Reconductoring**																	
	(a)By Aerial Bunched Cable	Km	13.86	5.1	8.76		12.5	4.5	8		2	1	1		4.1	1.45	2.65	
	(b)By Bare Conductor	Km													6.2	2.78	3.42	
7	**Trolley Based Mobile DT**	Nos	2	1	1													
8	Aerial Bunched Cables	Km																
C.	**Metering**																	
1	Feeder	Nos																
2	Consumer	Nos	2334	1236	1098		3401	1623	1778		2944	1682	1262		2435	883	1552	
3	**Others**																	
	(a) Improvement of Existing Service Connection		2748	1264	1484		26	12	14		65	27	38		941	370	571	
	(b) Testing bench/kit	Nos.																

Contd…

Sl. No.	Item of Work	Unit	Khawzawl	Yearwise Roll out Plan		
			Qty	2015-16	2016-17	2018-19
A.	**Feeder Separation**					
1	**33 KV Feeder**	Km				
2	Distribution Transformer	Nos				
B.	**Strengthening of Sub-Transmission and Distribution Network**					
1	**33/11 KV SS :**					
	(a)New substation	MVA				
	(b)Additional Bay/Bay Extension	LS				
	(c) Augmentation	No.				
2	**R&M of 33/11kV SS:**	LS	2	1	1	
3	**33 KV Line/Feeders**					
	(a)New/Bifurcation	Km				
	(b)Augmentation/ Reconductoring	Km				
4	**11 KV Line/Feeders**					
4.1	**New/Bifurcation**					
	a)By Aerial Bunched Cable	Km	2.2	0.8	1.4	
	b)By Bare Conductor	Km	2.35	1.12	1.23	
4.2	**Augmentation/ Reconductoring**					
	a)By Aerial Bunched Cable	Km				
	b)By Bare Conductor	Km				
5	**Distribution Transformer**					

Sl. No.	Item of Work	Unit	Khawzawl	Yearwise Roll out Plan		
			Qty	2015-16	2016-17	2018-19
	(a)New Installation	MVA	0.38	0.14	0.24	
	(b)R&M/Improvement	Nos				
6	**LT Line/Feeders**					
6.1	**New/Bifurcation**					
	(a)By Aerial Bunched Cable	Km				
	(b)By Bare Conductor	Km	3.75	1.26	2.5	
6.2	**Augmentation/ Reconductoring**					
	(a)By Aerial Bunched Cable	Km	5.15	2.15	3	
	(b)By Bare Conductor	Km				
7	**Trolley Based Mobile DT**	Nos				
8	Aerial Bunched Cables	Km				
C.	**Metering**					
1	Feeder	Nos				
2	Consumer	Nos	1494	568	926	
3	**Others**					
	(a) Improvement of Existing Service Connection		300	120	180	
	(b) Testing bench/kit	Nos.				

YEARWISE PROPOSED INFRASTRUCTURE PLAN FOR ALREADY SANCTIONED REDB PROJECT

Sl No.	Item of Work	Unit	Aizawl	Yearwise Roll Out Plan			Lunglei	Yearwise Roll Out Plan			Saiha	Yearwise Roll Out Plan			Kolasib	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
A.	**Strengthening of Sub-Transmission and Distribution Network**																	
1	**33/11 KV or 66/11 KV SS :**																	
	New substation	MVA					2	1.00	1.00		4.1	1.00	3.1					
	Augmentation/ Enhancement	MVA	2.5	2.5			3.2	1.6	1.6		1.6	0.8	0.8		5.7	1.9	1.9	1.9
	Additional Bay	LS					2	1.00	1.00		2	1.00	1.00					
2	**33 KV feeders**																	
	New	Km					58	20.00	20.00	18.00	80	30.00	30.00	20.00				
3	**11 KV feeders-**																	
	New	Km																

Sl No.	Item of Work	Unit	Champhai	Yearwise Roll Out Plan			Serchhip	Yearwise Roll Out Plan			Lawngtlai	Yearwise Roll Out Plan			Mamit	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
A.	**Strengthening of Sub-Transmission and Distribution Network**																	
1	**33/11 KV or 66/11 KV SS :**																	
	New substation	MVA	1.6	1.6			1.6	1.6										
	Augmentation/ Enhancement	MVA	1.6	1.6			2.5	2.5							5.7	1.9	1.9	1.9
	Additional Bay	LS	1	1.00			1	1.00										
2	**33 KV feeders**																	
	New	Km	27	10.00	10.00	7.00	24	8.00	8.00	8.00								
3	**11 KV feeders-**																	
	New	Km									60.63	20	20	20.63	25	10	10	5

YEARWISE PROPOSED INFRASTRUCTURE PLAN FOR ALREADY SANCTIONED DDUGJY (CONNECTING THE UNCONNECTED) PROJECT

Sl. No.	Item of Work	Unit	Aizawl	Yearwise Rollout Plan			Lunglei	Yearwise Rollout Plan			Saiha	Yearwise Rollout Plan			Kolasib	Yearwise Rollout Plan		
			Qty	**2016-17**	**2017-18**	**2018-19**	**Qty**	**2016-17**	**2017-18**	**2018-19**	**Qty**	**2016-17**	**2017-18**	**2018-19**	**Qty**	**2016-17**	**2017-18**	**2018-19**
1	11 KV feeders-																	
	New	Km	16.85	8.43	5.06	3.37	34.40	11.46	11.46	11.47	4.5	1.5	1.5	1.5	13.1	3.9	5.3	3.9
2	Distribution Transformer- New																	
	(a) 63kVA Distribution Transformer	MVA	0.063	0.063														
	(b) 100kVA Distribution Transformer	MVA																
	(c) 25kVA Distribution Transformer	MVA	0.150	0.05	0.05	0.05	0.275	0.110	0.083	0.083	0.225	0.075	0.075	0.075	0.100	0.050	0.025	0.025
3	LT Line : New Feeder/ Feeder Bifurcation																	
	(a) New LT Line(Gnat&Ant) 3-Ph 4 wire	Kms	6.80	3.400	2.040	1.360	5.80	1.450	2.900	1.450	7.00	2.0	3.0	2.0	3.00	1.000	1.000	1.000
4	Provisioning of Connection to																	
	BPL HH	No.	93	47	23	23	140	42	56	42	49	15	20	14	61	19	23	19

Sl. No.	Item of Work	Unit	Champhai	Yearwise Rollout Plan			Serchhip	Yearwise Rollout Plan			Lawngtlai	Yearwise Rollout Plan			Mamit	Yearwise Rollout Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
1	**11 KV feeders-**																	
	New	Km	7.1	2.1	2.9	2.1	10.25	3.08	4.10	3.08	34.50	10.35	10.35	10.35	87.5	26.25	35.00	26.25
2	**Distribution Transformer-New**																	
	(a) 63kVA Distribution Transformer	MVA	0.063	0.063														
	(b) 100kVA Distribution Transformer	MVA					0.300	0.100	0.100	0.100								
	(c) 25kVA Distribution Transformer	MVA	0.050	0.025	0.025		0.025	0.03			0.325	0.125	0.125	0.075	0.650	0.25	0.25	0.15
3	**LT Line : New Feeder/ Feeder Bifurcation**																	
	(a) New LT Line(Gnat & Ant) 3-Ph 4 wire	Kms	4.00	2	1	1	1.50	0.75	0.75		15.00	5.00	5.00	5.00	27.1	9.0	9.00	9.10
4	**Provisioning of Connection to**																	
	BPL HH	No.	76	23	30	23	3	1	2		52	18	18	16	459	153	153	153

YEARWISE PROPOSED INFRASTRUCTURE PLAN FOR ALREADY SANCTIONED NEC, NLCPR (DoNER) & SPA FUNDING

NEC Funded Scheme

Sl. No.	Item of Work	Unit	Kolasib	Yearwise Roll Out Plan				Lunglei	Yearwise Roll Out Plan			
			Qty	2015-16	2016-17	2017-18	2018-19	Qty	2015-16	2016-17	2017-18	2018-19
A.	**Strengthening of Sub-Transmission and Distribution Network**											
1	**33/11 KV or 66/11 KV SS :**											
	New substation	No.	1	0	0	0	1	1	0	0	0	1

NLCPR (DoNER) Funded Scheme

Sl. No.	Item of Work	Unit	Lwangtlai	Yearwise Roll Out Plan				Saiha	Yearwise Roll Out Plan			
			Qty	2015-16	2016-17	2017-18	2018-19	Qty	2015-16	2016-17	2017-18	2018-19
A.	**Strengthening of Sub-Transmission and Distribution Network**											
1	**33/11 KV or 66/11 KV SS :**											
	New substation	No.	2	0	0	0	2	1	0	0	0	1

SPA Funded Scheme

Sl. No.	Item of Work	Unit	Lunglei	Yearwise Roll Out Plan			
			Qty	2015-16	2016-17	2017-18	2018-19
A.	**Strengthening of Sub-Transmission and Distribution Network**						
1	**33/11 KV or 66/11 KV SS :**						
	New substation	No.	1	0	0	0	1

YEARWISE PROPOSED INFRASTRUCTURE PLAN FOR FUTURE IPDS SCHEME

Sl. No.	Item of Work	Unit	Mamit	Yearwise Roll Out Plan			Thenzawl	Yearwise Roll Out Plan			Kawnpui	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
A.	**Feeder Separation**													
1	**Distribution Transformer**	Nos.												
		MVA												
	(a) R&M of Distribution Transformer 63kVA	Nos.					5	2	3		2	1	1	
	(b) R&M of Distribution Transformer 100kVA	Nos.	3	2.00	1.00		7	3	4		1	1	1	
	(c) R&M of Distribution Transformer 250 kVA	Nos.	5	2.00	2.00	1.00	3	1.00	1.00	1.00	4	1.00	1.00	2.00
	(d) Replacement of LT Poles(Due to Rusting)	Nos	50	50.00			26	26.00			54	54.00		
B.	**Strengthening of Sub-Transmission and Distribution Network**													
1	**33/11 KV or 66/11 KV SS :**	MVA	5		5									
	New substation	No.	1		1.00									
2	**Brief Scope of R&M works in existing 33/11 KV or 66/11 KV substations**	Lot									1.00		1	
3	**33 KV feeders**													
	New	Km												
	Augmentation	Lot	1.00		1.00						1.00		1	
4	**11 KV feeders-**													
	New	Km	23.40	11.70	11.70		2.80	1.40	1.40		0.45	0.20	0.45	
	Augmentation	Km									1.00		1.00	
5	**Distribution Transformer-New**													
	(a) 63kVA Distribution	Nos					3.00	1.00	2.00					

Sl. No.	Item of Work	Unit	Mamit	Yearwise Roll Out Plan			Thenzawl	Yearwise Roll Out Plan			Kawnpui	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
	Transformer													
	(b) 100kVA Distribution Transformer	Nos	5	2.00	3.00		1		1.00		2	1.00	1.00	
	(c) 250kVA Distribution Transformer	Nos	4	2.00	2.00		1	1.00	1.00		1		1.00	
6	**Distribution Transformer-R&M/Augmentation**													
	(a) Augmentation by 100 kVA	Nos					2	1.00	1.00		3	1.00	2.00	
	(b) Augmentation by 250 kVA	Nos	2	2.00										
7	**LT Line : New Feeder/ Feeder Bifurcation**													
	(a) New LT Line(Gnat&Ant) 3-Ph 5 wire	Kms	14.00	4.50	4.50	5.00	6.80	2.20	2.20	2.40	5.70	1.90	1.90	1.90
	(b) New LT Line(Gnat&Grasshopper) 3-Ph 5 wire	Kms	14.15	4.70	4.70	4.75	7.00	2.00	2.00	3.00				
	(c) LT Line Bifurcation (Using ABC 70 sqmm)	Kms					0.15	0.05	0.05	0.05	1.50	0.50	0.50	0.50
	(d) LT Line Bifurcation (Using ABC 95 sqmm)	Kms					0.46	0.15	0.15	0.16				
	(e) LT Line Bifurcation (Using ABC 120 sqmm)	Kms					0.72	0.24	0.24	0.24				
8	**LT Line : Augmentation/Reconductoring**													
	(a) Conversion of 3-wire into 5-wire	Kms	0.50	0.50			4.00	4.00			5.60	5.60		
	(b) Reconductoring using Grasshopper	Kms	3.00	3.00			2.56	2.56			3.00	3.00		

Sl. No.	Item of Work	Unit	Mamit	Yearwise Roll Out Plan			Thenzawl	Yearwise Roll Out Plan			Kawnpui	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
	(c) Reconductoring using ABC 70 SQ mm	Kms					0.77	0.77						
	(d) Reconductoring using ABC 95 SQ mm	Kms	1.50	1.50			1.17	1.17						
	(e) Reconductoring using ABC 120 SQ mm	Kms	2.50	2.50			1.20	1.20						
9	**Provisioning of solar panel**													
	Location 1 100 /(Capacity)	KWp	1	1.00			1	1.00			1	1.00		
	Location 2 70/(Capacity)	KWp												
10	**Aerial Bunched Cables**													
	(a) 11kV 3x95Sqmm ABC New line	Kms	8.27	4.15	4.12									
	(b) New LT line by ABC 70 sqmm	Kms	3.27	3.27			3.27	3.27			3.27	3.27		
	(c) New LT line by ABC 95 sqmm	Kms					1.00	1.00						
	(d) New LT line by ABC 120 sqmm	Kms					3.00	3.00						
C.	**Metering**													
1	Feeder/Boundary meters	Nos	3	3			3	3			3	3		
2	Distribution Transformer	Nos	8	8			8	8			8	8		
3	Consumer													
	i) 1-Phase	Nos	800	800.00			620	620			450	450		
	ii) 3-Phase	Nos	100	100.00			80	80.00			50	50.00		

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Sl. No.	Item of Work	Unit	Vairengte	Yearwise Roll Out Plan			Hnahthial	Yearwise Roll Out Plan			Khawhai	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
A.	**Feeder Separation**													
1	**Distribution Transformer**	Nos.												
		MVA												
	(a) R&M of Distribution Transformer 63kVA	Nos.	3	1	2						2		1	
	(b) R&M of Distribution Transformer 100kVA	Nos.	2	1	1		3	1	2		1		1	
	(c) R&M of Distribution Transformer 250 kVA	Nos.	4	1.00	1.00	2.00	4	1.00	1.00	2.00				
	(d) Replacement of LT Poles(Due to Rusting)	Nos	20	20.00			30	30.00			10	10.00		
B.	**Strengthening of Sub-Transmission and Distribution Network**													
1	**33/11 KV or 66/11 KV SS :**	MVA												
	New substation	No.												
2	**Brief Scope of R&M works in existing 33/11 KV or 66/11 KV substations**	Lot	1.00		1		1.00		1					
3	**33 KV feeders**													
	New	Km									36	18.00	18.00	
	Augmentation	Lot					1.00		1.00					
4	**11 KV feeders-**													
	New	Km	3.0	1.50	1.50		2.50	1.25	1.25		1.50	0.75	0.75	
	Augmentation	Km	1.00		1.00									
5	**Distribution Transformer-New**													
	(a) 63kVA Distribution Transformer	Nos	1		1.00									
	(b) 100kVA Distribution Transformer	Nos	2	1.00	1.00		2	1.00	1.00		1		1.00	
	(c) 250kVA Distribution	Nos	1		1.00		1		1.00		0			

Sl. No.	Item of Work	Unit	Vairengte	Yearwise Roll Out Plan			Hnahthial	Yearwise Roll Out Plan			Khawhai	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
	Transformer													
6	**Distribution Transformer-R&M/Augmentation**													
	(a) Augmentation by 100 kVA	Nos					1		1.00					
	(b) Augmentation by 250 kVA	Nos												
7	**LT Line : New Feeder/ Feeder Bifurcation**													
	(a) New LT Line(Gnat&Ant) 3-Ph 5 wire	Kms	6.00	2.00	2.00	2.00	1.50	0.50	0.50	0.50	2.00	0.50	0.50	1.00
	(b) New LT Line(Gnat&Grasshopper) 3-Ph 5 wire	Kms	6.00	2.00	2.00	2.00	5.50	1.50	2.00	2.00				
	(c) LT Line Bifurcation (Using ABC 70 sqmm)	Kms	1.50	0.50	0.50	0.50	1.50	0.50	0.50	0.50				
	(d) LT Line Bifurcation (Using ABC 95 sqmm)	Kms	1.50	0.50	0.50	0.50	1.25	0.25	0.50	0.50				
	(e) LT Line Bifurcation (Using ABC 120 sqmm)	Kms	1.50	0.50	0.50	0.50	1.25	0.25	0.50	0.50				
8	**LT Line : Augmentation/Reconductoring**													
	(a) Conversion of 3-wire into 5-wire	Kms	5.00	5.00			1.50	1.50						
	(b) Reconductoring using Grasshopper	Kms	5.00	5.00			2.00	2.00						
	(c) Reconductoring using ABC 70 SQ mm	Kms	2.00	2.00			2.00	2.00						

Sl. No.	Item of Work	Unit	Vairengte	Yearwise Roll Out Plan			Hnahthial	Yearwise Roll Out Plan			Khawhai	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
	(d) Reconductoring using ABC 95 SQ mm	Kms	1.50	1.50			1.50	1.50						
	(e) Reconductoring using ABC 120 SQ mm	Kms												
9	**Provisioning of solar panel**													
	Location 1 100 /(Capacity)	KWp	1	1.00			1	1.00						
	Location 2 70/(Capacity)	KWp									1	1.00		
10	**Aerial Bunched Cables**													
	(a) 11kV 3x95Sqmm ABC New line	Kms												
	(b) New LT line by ABC 70 sqmm	Kms	3.27	3.27			0.50	0.50			3.27	3.27		
	(c) New LT line by ABC 95 sqmm	Kms					1.00	1.00						
	(d) New LT line by ABC 120 sqmm	Kms					1.50	1.50						
C.	**Metering**													
1	Feeder/Boundary meters	Nos	3	3			3	3			2	2		
2	Distribution Transformer	Nos	8	8			8	8			5	5		
3	Consumer													
	i) 1-Phase	Nos	620	620			620	620			260	260		
	ii) 3-Phase	Nos	80	80.00			80	80.00			40	40		

YEARWISE PROPOSED INFRASTRUCTURE PLAN FOR FUTURE DDUGJY (DISTRIBUTION SYSTEM STRENGTHENING) SCHEME

Sl. No.	Item of Work	Unit	Aizawl	Yearwise Roll Out Plan			Lunglei	Yearwise Roll Out Plan			Saiha	Yearwise Roll Out Plan			Kolasib	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
A.	**Feeder Separation**																	
1	11 KV Feeder	Km													16.5	5	5	6.5
2	LT Line	Km													10	4	3	3
3	**Distribution Transformer**	MVA													0.15	0.5	0.5	0.5
B.	**Strengthening of Sub-Transmission and Distribution Network**																	
1	**33/11 KV or 66/11 KV SS :**	MVA																
	New substation	No.																
	Augmentation/Enhancement	No.																
2	***Brief Scope of R&M works in existing 33/11 KV or 66/11 KV substations***	Lot									Lot							
3	**33 KV feeders**																	
	New	Km																
	Augmentation	Lot													92.60	32.6	32.6	27.4
4	**11 KV feeders-**																	
	New	Km	49.00	19.6	14.7	14.7	48.00	20.16	20.16	7.18	8.5	3	3	2.5				
5	**Distribution Transformer-R&M/Augmentation**																	
	(a) Augmentation by 63 kVA	Nos					1	1										
	(b) Augmentation by 100 kVA	Nos					1	1										
	(c) Augmentation by 250 kVA	Nos					2	2										

Sl. No.	Item of Work	Unit	Aizawl	Yearwise Roll Out Plan			Lunglei	Yearwise Roll Out Plan			Saiha	Yearwise Roll Out Plan			Kolasib	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
C.	**Metering**																	
1	Feeder/Boundary meters	Nos	19	10	5	4	22	8	8	6	4	2	1	1	15	5	5	5
2	Distribution Transformer	Nos	280	100	100	80	179	60	60	59	61	21	20	20	88	37	37	14
3	Consumer		2280	1000	1000	280	2002	1001	500	501	2767	1000	1000	767	2947	1000	1000	947

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Sl. No.	Item of Work	Unit	Champhai	Yearwise Roll Out Plan			Serchhip	Yearwise Roll Out Plan			Lwangtlai	Yearwise Roll Out Plan			Mamit	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
A.	**Feeder Separation**																	
1	11 KV Feeder	Km	15	5	5	5									2	1	1	
2	LT Line	Km	9.5	3.5	3	3									2	1	1	
3	**Distribution Transformer**	MVA	0.275	0.125	0.75	0.75									0.025	0.025		
B.	**Strengthening of Sub-Transmission and Distribution Network**																	
1	**33/11 KV or 66/11 KV SS :**																	
	New substation	MVA													1	1		
	Augmentation/Enhancement	No.																
2	***Brief Scope of R&M works in existing 33/11 KV or 66/11 KV substations***	Lot	5	3	1	1	2	1	1						2	1	1	
3	**33 KV feeders**																	
	New	Km																
	Augmentation	Lot																
4	**11 KV feeders-**																	
	New	Km	4	2	1	1	4	2	1	1	27.5	10	10	7.5	1	1		
5	**Distribution Transformer-R&M/Augmentation**																	
	(a) Augmentation by 63 kVA	Nos	1	1			2	1	1						2	1	1	
	(b) Augmentation by 100 kVA	Nos	1	1			1		1		2	1	1		3	1	1	1
	(c) Augmentation by 250 kVA	Nos	3	3			2	1	1						2	1	1	

Sl. No.	Item of Work	Unit	Champhai	Yearwise Roll Out Plan			Serchhip	Yearwise Roll Out Plan			Lwangtlai	Yearwise Roll Out Plan			Mamit	Yearwise Roll Out Plan		
			Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19	Qty	2016-17	2017-18	2018-19
C.	**Metering**																	
1	Feeder/Boundary meters	Nos	30	10	10	10	10	4	4	2	12	4	4	4	20	10	5	5
2	Distribution Transformer	Nos	255	100	100	55	66	22	22	22	97	50	20	27	164	64	50	50
3	Consumer	Nos	2507	1000	1000	507	1942	1000	500	442	2028	1000	500	528	2239	1000	1000	239

ANNEXURE-XI

Details of System Strengthening Plan of Mizoram FY 2015-16 to 2017-18

Category	Schemes involved	Benefits	Basis/Norms
Load Growth	Creation of new substations and associated 33/11kV Lines	• To meet with the load growth in the area • To release new connection of various categories • Reduction in the loading on the existing Sub-Stations. • Reduction of the AT&C losses of the overloaded system.	• The Existing loading of the sub-station is analysed. • The Load growth of the sub-station is calculated taking into consideration: a) Load growth on the basis of peak load recorded on AP and other feeders in previous two years to facilitate running of AP feeders in two groups b) To ensure Reliable power supply to other categories based on load projections. • On the basis of load growth worked out and present loading condition of the Sub-Station, Augmentation of existing Sub-Station is proposed if technically feasible other wise creation of new sub-station is proposed near load centre.
	Augmentation of existing substations and associated 33kV Lines	• To meet with the load growth in the area • To release new connection of various categories • Reduction in the loading on the existing Sub-Stations. • Reduction of the AT&C losses of the overloaded system.	• The Existing loading of the sub-station is analysed. • The Load growth of the sub-station is calculated taking into consideration: a) Load growth on the basis of peak load recorded on AP and other feeders in previous two years to facilitate running of AP feeders in two groups b) To ensure Reliable power supply to other categories based on load projections. • On the basis of load growth worked out and present loading condition of the Sub-Station, Augmentation of existing Sub-Station is proposed if technically feasible.
Load Growth	Bifurcation / trifurcation of 11kV feeders	• To achieve voltage regulation at tail end. • Reduction in Technical losses due to decrease in length of 11 KV overloaded lines and appropriate size of conductor. • Reduction in tripping resulting into increase in reliability of power / consumer satisfaction.	• The Voltage of feeder at tail end is analyzed. • If the loading of the feeder goes beyond 200 Amps, bifurcation/trifurcation of the feeder is proposed.

Category	Schemes involved	Benefits	Basis/Norms
	Augmentation of Existing DT and associated LT line	• To meet with the load growth in the area • To release new connection of various categories • Reduction in the loading on the existing Distribution Transformer. • To achieve Steady & desired voltage level.	• Based on the peak load recorded on the existing DTs and the new connections applied in the area. • On the basis of the present loading of the Distribution Transformer, existing DT is augmented if feasible else new DT is proposed.
	Providing Additional Distribution Transformer and associated 11kV and LT Line	• To meet with the load growth in the area • To release new connection of various categories • Reduction in the loading on the existing Distribution Transformer. • To achieve Steady & desired voltage level.	• Based on the peak load recorded on the existing DTs and the new connections applied in the area. • On the basis of the present loading of the Distribution Transformer, A new DT is proposed if the existing DT cannot be augmented.
AT&C loss reduction	Replacement of defective and electromechanical meters	• Accurate meter reading from remote locations. • Timely generation of bills • No blockage of Revenue on account of defective meters	• No blockage of Revenue on account of defective meters.
AT&C loss reduction	Shifting of meters outside the consumer's premises and at reasonable height for proper reading	• Effective curbing of pilferage of energy by unauthorized consumers. • Accurate recording of energy consumption. • Avoidance of meter tampering	• In urban & Semi-urban areas meters are to be shifted outside the consumer premises and installed at outer wall (preferably) or nearby pole. • In rural areas, the meters shall be shifted outside consumer premises in meter boxes such as 1-in-1, 2-in-1, 4-in-1 & 6-in1 and in extreme cases 20-in-1 meter pillar boxes. • LT conductor would also be replaced with AB cable in theft prone areas.
	Replacement of Bare Conductor by LT AB Cable in theft prone areas	• To mitigate direct hooking on the LT System.	Only in theft prone and rural areas.
	Replacement of Undersized Conductors / outlived or worn out Conductors on feeders with frequent breakdowns	• Reduction in Technical losses due to replacement by appropriate size of conductor. • Reduction in tripping resulting into increase in reliability of power/consumer satisfaction.	• Provision of 80 – 100 Sqmm conductor in City areas • Existing conductors can be changed as per the requirements in phases

ANNEXURE-XII

AVERAGE BILLING RATE

Sl. No.	Description	Rate (Rs/unit)	FY 2015-16		FY 2016-17		FY 2017-18		FY 2018-19	
			MU	Rs Crores	MU	Rs Crores	MU	Rs Crores	MU	Rs Crores
1	Domestic	3.33	252.07	84	295.04	98	336.76	112	383.07	128
2	Other than domestic	5.41	121.05	65	134.37	73	149.15	81	165.56	90
	Total		**373.12**	**149**	**429.41**	**171**	**485.91**	**193**	**548.63**	**218**
	Weighted average ABR	Rs/unit		**3.99**		**3.98**		**3.97**		**3.97**

EXISTING & PROPOSED POWER NETWORKS OF MIZORAM INCLUDING EXISTING & UNDER CONSTRUCTION OF HYDRO STATION

(As on September 2014)

ASSAM

MANIPUR

MYANMAR

BANGLADESH

VAIRENGTE 1X3.0MVA

12KM

15.5KM

1x2.15MVA (33/11kV) Saiphai

60MW TUIRIAL SHP

BILKHAWTHLIR 1x2.5MVA

12MW SERLUI'B' SHP

19.5KM

BAIRABI (Thermal) 2x15MVA(33/132kV) 1X3.0MVA (132/33kV)

BAWKTLANG & KOLASIB 2x12.5MVA(E) 1x25KVA(N)

30.01KM

7KM

KOLASIB 1x3.0MVA

Sakawrdai (33/11kV, 1x1.6MVA

70KM

Zawtnuam

5.5KM

BAIRABI (33/11) 1x2.5MVA

N. BUKPUI 1x2.5MVA

38KM

28.25KM

ZAMUANG 1x3.15MVA

KAWNPUI 1x3.0MVA

74KM

25.10KM

12.97KM

DARLAWN 1x12.5 MVA (N) 2x2.5MVA (33/11kV)

47KM

MAMIT DIST

MAMIT 2x2.5 MVA (33/11kV)

20KM

SENTLANG 1x2.5MVA

ZOKHAWSANG 1x2.5MVA

NGOPA

NGOPA 1x12.5 MVA (N) 1x2.5MVA (33/11kV)

SAIRANG 1x2.5MVA

KHAWRUHLIAN 1X2.5 + 1X3.15(N) MVA (500KVA)

60.69KM

PHULLEN (RGGVY) 1x1.6MVA

LENGPUI 1x2.5MVA

5.5KM

33.78KM

36KM

DURTLANG 2x2.5MVA

ZUANGTUI 2x12.5MVA 2x2.5 + 2x6.3MVA

RAWPUICHHIP 1x1.6MVA

SIHHMUI 2x150 MVA 132/33kV

11KM

6.5KM

14KM

40KM

3x1 MW Teirei SHP

LUANGMUAL 2x12.5 MVA 1x6.3MVA (33/11kV)

3KM

5.97KM

50KM

HNAHLAN 1x1.6MVA

Aizawl (Indoor) 2x6.3MVA

26KM

3.74KM

14.3KM

SAITUAL 1x12.5 MVA (N) 1x6.3MVA(E) 1x3.0MVA (33/11kV)

57.27KM

75KM

W. PHAILENG 1x2.5 MVA (33/11kV)

W. PHAILENG 2x12.5 MVA (132/33kV)

MUALPUI 2x6.3 MVA

AIZAWL, MELRIAT 2x12.5 MVA (O)

NGSULTHUAH 1X2.5MVA

KAWLKULH 1x2.5MVA

RABUNG (RGGVY)

CHAWNPUI 2x6.3MVA

4.2KM

43KM

31KM

37KM

CHAMPHAI DIST

TLANGNUAM 2x6.3MVA

54.04KM

3x100 MW Tuirivang SHP

28KM

25KM

KHAWZAWL 1x12.5 MVA(O) 1x2.5MVA (33/11kV)

2x250+1x500 MW Serlui A SHP

AIBAWK 1x2.5MVA

59KM

27KM

18.2KM

1x1.6MVA (33/11kV) Phuldungsei

CHHINGCHHIP 1x1.6MVA

28KM

CHAMPHAI 1x12.5MVA (O) 1x6.3MVA (33/11kV)

CHAMPHAI (U) 1x2.5MVA

SIALSUK 1x2.5MVA

20KM

16KM

SERCHHIP DIST

Khawhai 1x2.5MVA

CHAMPHAI (L) 1x6.3MVA

5.5KM

2x0.25 MW

32KM

BUKPUI 1x12.5 MVA(E) + 1x6.3(E) 1x25MVA(N) 1x3.0 + 1x2.5MVA (33/11kV)

Sialhawk 1x2.5MVA

2x0.25 KW

KHUANGLENG 1x2.5MVA

MARPARA 2x12.5 MVA (132/33kV)

THENZAWL 1x12.5 MVA (N) 1x1.6MVA (33/11kV)

15KM

56.38KM

28KM

45.51KM

47.89KM

36KM

THENHLUM 1x2.5MVA

1x2.5MVA (33/11kV) Buarpui

E. LUNGDAR 1x12.5 MVA (N) 1x2.5 MVA (33/11kV)

S. Khawbung 1x6.3MVA

IVA SHP (2MW)

59KM

31KM

CHEKAWN (RGGVY 1x1.6MVA

18KM

TLAWVA SHP (5MW)

30KM

Kau-Tlabung SHP (1.5MW)

11KM (Melriat - Lunglei)

LUNGLEI DIST

ZAIZAWHTLANG 1x2.5MVA

39KM

Farkawn 1x6.3MVA

Maicham - II SHP

Maicham - I SHP

MUALTHUAM (RGGVY) 1x1.6MVA

69.13KM

HNAHTHIAL 1x2.0MVA

TLABUNG 1x1.6 + 1x3.15(N) MVA

40KM

KHAWIVA 2x12.5 MVA (132/33kV)

Khawiva

LUNGSEN 2x2.5MVA

LUNGLEI (Khawiva) 1x12.5MVA

30KM

37.34KM

13.8KM

THEIRIAT 1x6.3MVA

LUNGSEN 2x12.5 MVA (132/33kV)

11.24KM

LUNGLEI 1x2.5MVA

75KM

SAZAIKAWN 1x6.3MVA

42KM

SANGAU (RGGVY) 1x2.5MVA (33/11kV)

TAWIPUI N (RGGVY) 1x1.6MVA

57KM

BUALPUI NG W (RGGVY) 1x2.5MVA

CHAWNGTE (RGGVY) 1x2.5MVA (33/11kV)

LAWNGTLAI 1x12.5 MVA (N) 1x2.5 + 1x1.6 MVA (33/11kV)

SAIHA DISTRICT

30.32KM

SAIHA 1x12.5 MVA (N) 1x2.5 + 1x0.75MVA (33/11kV)

80KM

60KM

Tuipanglui SHP

50KM

SAIBAWH (RGGVY) 1x2.5MVA (33/11kV)

S. BUNGTLANG 33/11kV

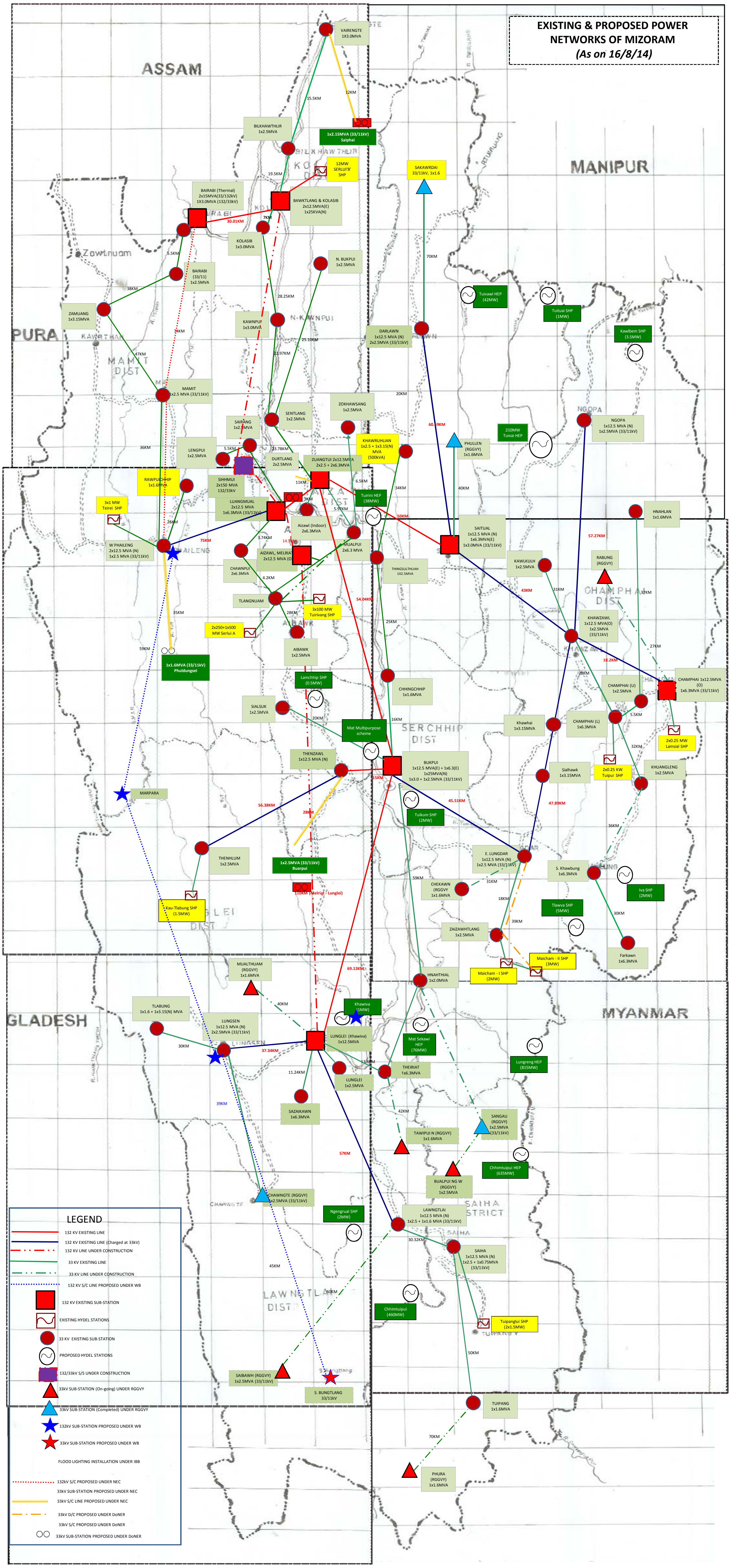
TUIPANG 1x1.6MVA

70KM

PHURA (RGGVY) 1x1.6MVA

LEGEND

- 132 KV EXISTING LINE
- 132 KV EXISTING LINE (Charged at 33kV)
- 132 KV LINE UNDER CONSTRUCTION
- 33 KV EXISTING LINE
- 33 KV LINE UNDER CONSTRUCTION
- 132 KV S/C LINE PROPOSED UNDER WB (1st Tranche)
- 132 KV EXISTING SUB-STATION
- EXISTING HYDEL STATIONS
- 33 KV EXISTING SUB-STATION
- 132/33kV S/S UNDER CONSTRUCTION
- 33kV SUB-STATION (On-going) UNDER RGGVY
- 33kV SUB-STATION (Completed) UNDER RGGVY
- 132kV SUB-STATION PROPOSED UNDER WB (1st Tranche)
- 33kV SUB-STATION PROPOSED UNDER WB
- 33kV SUB-STATION PROPOSED UNDER NEC
- 132kV S/C PROPOSED UNDER NEC
- 33kV S/C LINE PROPOSED UNDER NEC
- 33kV D/C PROPOSED UNDER DoNER
- 33kV S/C PROPOSED UNDER DoNER
- 33kV SUB-STATION PROPOSED UNDER DoNER


EXISTING & PROPOSED POWER
NETWORKS OF MIZORAM
(As on 16/8/14)
ASSAM
MANIPUR
PURA
GLADESH
MYANMAR
Zawtnuam
MAMIT DIST
SERCHHIP DIST
CHAMPHAI DIST
SAIHA STRICT
LAWNGTLAI DIST
VAIRENGTE 1X3.0MVA
12KM
15.5KM
1x2.15MVA (33/11kV) Saiphai
BILKHAWTHLIR 1x2.5MVA
12MW SERLUI'B' SHP
19.5KM
BAIRABI (Thermal) 2x15MVA(33/132kV) 1X3.0MVA (132/33kV)
BAWKTLANG & KOLASIB 2x12.5MVA(E) 1x25KVA(N)
30.01KM
7KM
KOLASIB 1x3.0MVA
5.5KM
BAIRABI (33/11) 1x2.5MVA
N. BUKPUI 1x2.5MVA
38KM
28.25KM
ZAMUANG 1x3.15MVA
KAWNPUI 1x3.0MVA
74KM
25.10KM
47KM
22.97KM
MAMIT 1x2.5 MVA (33/11kV)
SAKAWRDAI 33/11kV, 1x1.6
70KM
Tuivawl HEP (42MW)
Tuituai SHP (1MW)
Kawlbem SHP (3.5MW)
DARLAWN 1x12.5 MVA (N) 2x2.5MVA (33/11kV)
20KM
ZOKHAWSANG 1x2.5MVA
SENTLANG 1x2.5MVA
SAIRANG 1x2.5MVA
60.59KM
NGOPA 1x12.5 MVA (N) 1x2.5MVA (33/11kV)
210MW Tuivai HEP
PHULLEN (RGGVY) 1x1.6MVA
KHAWRUHLIAN 1x2.5 + 1x3.15(N) MVA (500kVA)
36KM
LENGPUI 1x2.5MVA
5.5KM
23.78KM
DURTLANG 2x2.5MVA
ZUANGTUI 2x12.5MVA 2x2.5 + 2x6.3MVA
RAWPUICHHIP 1x1.6MVA
SIHHMUI 2x150 MVA 132/33kV
11KM
6.5KM
34KM
40KM
3x1 MW Teirei SHP
LUANGMUAL 2x12.5 MVA 1x6.3MVA (33/11kV)
3KM
Tuirini HEP (38MW)
5.97KM
50KM
HNAHLAN 1x1.6MVA
26KM
Aizawl (Indoor) 2x6.3MVA
SAITUAL 1x12.5 MVA (N) 1x6.3MVA(E) 1x3.0MVA (33/11kV)
57.27KM
W PHAILENG 2x12.5 MVA (N) 1x2.5 MVA (33/11kV)
75KM
3.74KM
14.5KM
MUALPUI 2x6.3 MVA
AIZAWL, MELRIAT 2x12.5 MVA (O)
THINGSULTHLIAH 1X2.5MVA
KAWLKULH 1x2.5MVA
RABUNG (RGGVY)
CHAWNPUI 2x6.3MVA
4.2KM
43KM
31KM
37KM
TLANGNUAM
54.04KM
3x100 MW Tuirivang SHP
28KM
35KM
2x250+1x500 MW Serlui A
25KM
KHAWZAWL 1x12.5 MVA(O) 1x2.5MVA (33/11kV)
27KM
59KM
1x1.6MVA (33/11kV) Phuldungsei
AIBAWK 1x2.5MVA
18.2KM
28KM
CHAMPHAI 1x12.5MVA (O) 1x6.3MVA (33/11kV)
CHAMPHAI (U) 1x2.5MVA
Lamchhip SHP (0.5MW)
CHHINGCHHIP 1x1.6MVA
5.5KM
SIALSUK 1x2.5MVA
20KM
16KM
Khawhai 1x3.15MVA
CHAMPHAI (L) 1x6.3MVA
Mat Multipurpose scheme
2x0.25 MW Lamsial SHP
32KM
THENZAWL 1x12.5 MVA (N)
BUKPUI 1x12.5 MVA(E) + 1x6.3(E) 1x25MVA(N) 1x3.0 + 1x2.5MVA (33/11kV)
Sialhawk 1x3.15MVA
2x0.25 KW Tuipui SHP
KHUANGLENG 1x2.5MVA
15KM
MARPARA
56.38KM
28KM
45.51KM
47.89KM
Tuikum SHP (2MW)
36KM
THENHLUM 1x2.5MVA
1x2.5MVA (33/11kV) Buarpui
E. LUNGDAR 1x12.5 MVA (N) 1x2.5 MVA (33/11kV)
S. Khawbung 1x6.3MVA
59KM
CHEKAWN (RGGVY 1x1.6MVA
31KM
Iva SHP (2MW)
110KM (Melriat - Lunglei)
18KM
Kau-Tlabung SHP (1.5MW)
Tlawva SHP (5MW)
30KM
39KM
ZAIZAWHTLANG 1x2.5MVA
Farkawn 1x6.3MVA
MUALTHUAM (RGGVY) 1x1.6MVA
69.13KM
Maicham - II SHP (3MW)
Maicham - I SHP (2MW)
HNAHTHIAL 1x2.0MVA
40KM
Khawiva (1MW)
TLABUNG 1x1.6 + 1x3.15(N) MVA
LUNGSEN 1x12.5 MVA (N) 2x2.5MVA (33/11kV)
LUNGLEI (Khawiva) 1x12.5MVA
Mat Sekawi HEP (76MW)
30KM
37.34KM
Lungreng HEP (815MW)
13.8KM
THEIRIAT 1x6.3MVA
11.24KM
LUNGLEI 1x2.5MVA
39KM
SAZAIKAWN 1x6.3MVA
42KM
TAWIPUI N (RGGVY) 1x1.6MVA
SANGAU (RGGVY) 1x2.5MVA (33/11kV)
57KM
Chhimtuipui HEP (635MW)
BUALPUI NG W (RGGVY) 1x2.5MVA
CHAWNGTE (RGGVY) 1x2.5MVA (33/11kV)
Ngengrual SHP (2MW)
LAWNGTLAI 1x12.5 MVA (N) 1x2.5 + 1x1.6 MVA (33/11kV)
30.32KM
SAIHA 1x12.5 MVA (N) 1x2.5 + 1x0.75MVA (33/11kV)
45KM
60KM
Chhimtuipui (460MW)
Tuipanglui SHP (2x1.5MW)
50KM
SAIBAWH (RGGVY) 1x2.5MVA (33/11kV)
S. BUNGTLANG 33/11kV
TUIPANG 1x1.6MVA
70KM
PHURA (RGGVY) 1x1.6MVA
LEGEND
132 KV EXISTING LINE
132 KV EXISTING LINE (Charged at 33kV)
132 KV LINE UNDER CONSTRUCTION
33 KV EXISTING LINE
33 KV LINE UNDER CONSTRUCTION
132 KV S/C LINE PROPOSED UNDER WB
132 KV EXISTING SUB-STATION
EXISTING HYDEL STATIONS
33 KV EXISTING SUB-STATION
PROPOSED HYDEL STATIONS
132/33kV S/S UNDER CONSTRUCTION
33kV SUB-STATION (On-going) UNDER RGGVY
33kV SUB-STATION (Completed) UNDER RGGVY
132kV SUB-STATION PROPOSED UNDER WB
33kV SUB-STATION PROPOSED UNDER WB
FLOOD LIGHTING INSTALLATION UNDER IBB
132kV S/C PROPOSED UNDER NEC
33kV SUB-STATION PROPOSED UNDER NEC
33kV S/C LINE PROPOSED UNDER NEC
33kV D/C PROPOSED UNDER DoNER
33kV S/C PROPOSED UNDER DoNER
33kV SUB-STATION PROPOSED UNDER DoNER