24X7 POWER FOR ALL MEGHALAYA

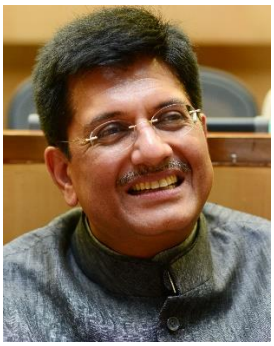
A Joint Initiative of Government of India and Government of Meghalaya

सत्यमेव जयते

Government of India

Piyush Goyal

Union Minister of State (IC)
Power, Coal, New & Renewable Energy



Foreword

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

This joint initiative of Government of India and Government of Meghalaya 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 Meghalaya and wish them all the best for implementation of this programme. The Government of India will complement the efforts of Government of Meghalaya in bringing uninterrupted quality power to each household, farmer, small & medium enterprises and establishment in the state.

Dr. Mukul Sangma
Chief Minister of Meghalaya

Government of Meghalaya

Foreword

Meghalaya is amongst the States in the country which are endeavouring to ensure a sustained surplus in electricity. Electricity is critical to livelihoods and essential to well-being. Dependable electricity is the life line of industrial and commercial businesses, as well as a necessity for the productivity and comfort of residential customers.

The implementation of 24x7 "Power For All" programme is therefore a welcome initiative. In Meghalaya, we are continuously meeting more than 97% of our demand and offering one of the lowest tariffs in the country for almost all categories of consumers.

The utilities of Meghalaya are committed to provide reliable electricity to all sections of consumers. Further, even though our terrain is difficult, the State is committed to overcome the challenges and provide electricity to even the most remote habitations. We have accordingly captured the requirement in the roadmap to achieve this objective in time bound manner and funding requirements have been spelt out.

The programme of 24x7 "Power For All" will help us further improve the quality of our service delivery. The roadmap provides clear sight of the expectations from both Government of India and the State Government in ensuring desired outcomes.

Meghalaya is strategically important as it shares a long border with Bangladesh. Surplus power available with us can lead to sale of power to Bangladesh, thereby further strengthening ties with our neighbouring country.

I strongly believe that the 24 x 7 initiative must help address the issues of reduction of AT&C losses, bridging the gap between ACS & ARR as well as customer centric initiatives for ultimate customer satisfaction. Availability of power and access to it will definitely bring upon a change in the socio-economic environment of rural hilly areas which is very important to check migration of population.

I am optimistic that this 24x7 "Power For All" document, prepared after several rounds of negotiations and meetings between personnel at State and Central level, facilitated by senior officers of Ministry of Power, will play a pivotal role in paving the way forward for accomplishing Meghalaya Government's commitment and preparedness towards reinforcing the status of Meghalaya as a power-cut free state and providing every citizen access to 24x7 reliable, quality and affordable power supply.

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Joint Statement

24x7 Power for All' (PFA) programme will be implemented by Government of Meghalaya (GoMe) with active support from Government of India with the objective to connect the unconnected in phased manner by FY 19, ensure 24x7 quality, reliable and affordable power supply to all Domestic, Commercial Agriculture and Industrial consumers within a fixed time frame.

Government of Meghalaya is attaching highest priority to power sector and power supply position is constantly reviewed. The State is committed to provide full support to all utilities for ensuring quality power supply.

Government of Meghalaya would ensure that all the necessary steps outlined in the PFA document are taken up in terms of village electrification, capacity addition, power purchase planning, strengthening the required transmission and distribution network, encouraging renewables, 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 continue to support the efforts of Government of Meghalaya by fast tracking resolution of key issues pertaining to generation and ensuring optimum fund allocations in various distribution schemes (as per provisions of applicable policies).

It is envisaged to cover the entire state under PFA programme in a phased manner and provide 24x7 power supply to all domestic, agriculture industrial and commercial consumers for all connected households from FY 17 itself and to all un-connected households by FY 19.

Government of Meghalaya would endeavor to implement the programme much earlier than the above targeted dates with the support of Government of India on scheme allocations.

The central and state governments would meet regularly to review the progress of the programme over the next 3.5 years and would strive to achieve the objectives of the programme by taking the necessary steps as envisaged in the PFA document.

Jyoti Arora

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

Pankaj Jain, IAS
Principal Secretary, Power Department,
Government of Meghalaya

EXECUTIVE SUMMARY

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

Meghalaya is one of the few states in India which despite having surplus availability, have lower per capita consumption than the national average of 1000 kWh. (Per capital consumption of the state has marginally grown from 456 kWh in FY 12 to 499 kWh in FY 15).

CONNECTING THE UNCONNECTED

Execution of RGGVY scheme is already in progress in the state. However, according to projections (keeping census projections as sacrosanct), there are 2,15,601 un-electrified households in the state.

The state proposes to electrify a total of 2,07,958 households through grid. Out of these, 1,87,290 households are proposed to be covered with electrification of 895 villages. Further, 20,668 households are proposed to be electrified in urban areas.

Further, 7,643 households are in remote areas and are being covered through off-grid solutions.

Out of the 219 villages/hamlets, MNREDA has already electrified 134 villages. Proposal for electrification of remaining villages is already in active perusal with MNRE. Another 14+3 villages are proposed to be covered in DDUGJY/RGGVY through DDG schemes. The state has estimated a total expenditure of Rs 742.18 Crores i.e. around Rs 39,500/- per household for connecting these households.

FEEDER SEGREGATION

Keeping in view of the negligible sales in agriculture category, the state has not estimated any expenditure on this account.

24 X 7 SUPPLY

The state is already supplying power to the extent of 23-24 hours in urban areas and 22-24 hours in rural areas. However, the demand in domestic category is presently still suppressed owing localized capacity constraints, which are targeted to be addressed through various strengthening schemes during this period.

The state will endeavor to ensure 24 hours supply from FY 17 itself.

GROWTH IN DEMAND

In order to achieve the objective of 24 x 7 supply in the state, the state would see an increase in peak demand from 370 MW in FY 15 to 444 MW in FY 19 with corresponding increase in energy requirement from 1634 MU in FY 15 to 2049 MU in FY 19.

In the present conditions, the peak demand of 370 MW in FY 15 was almost fully met owing to the availability of a large hydro-power capacity in the state.

The future demands have been derived by estimating the urban and rural household consumption after 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 hand. Individual category-wise growth rate equivalent to the 5 year CAGR has been considered for other than domestic sectors.

The daily household consumption has been computed separately for rural and urban

households for FY 15 and escalated by 4% annually in rural areas (from 1.48 units to 1.73 units) and 7% in urban areas (from 6.03 units to 7.91 units) to arrive at the daily household consumption up to FY 19

SUPPLY ADEQUACY

The present firm availability of the state is 492.47 MW (excluding share from unallocated quota).

Historically, about 40% of the power is being sourced from state owned generating stations and 44% power is being sourced from CGS.

Since the state is surplus in summer and deficit in winter, it depends on swapping and short term purchase to the extent of 16%.

In order to meet the increasing demand, the state has already planned additional capacity availability of 171.5 MW through own generating stations, renewable energy sources and central generating stations in a phased manner by FY 19 by investing Rs 297 Crores for own generation.

As Meghalaya will be having projected energy availability of more than 100% through firm share in FY 19, there is no requirement of purchase through short term power as of now.

The state needs to optimize its power purchase and should look forward for selling the surplus power to prospective deficit states so as to earn revenue for the state.

ADEQUACY OF TRANSMISSION NETWORK

The existing ISTS transmission line capacity and transformation capacity is adequate for meeting the present as well as future requirements.

The transmission schemes planned in the state (including NERSIP) would increase the present transformation capacity by 1225 MVA resulting in an overall transformation capacity of 2840 MVA (both inter-state as well as intra-state).

The existing intra/ inter-state transmission system with the planned investment of Rs 1135 Crores towards capacity addition would be adequate to meet the requirement as envisaged for 24x7 PFA.

ADEQUACY OF DISTRIBUTION NETWORK

The state has envisaged a requirement of Rs 510 Crores in strengthening of infrastructure in urban areas. Further, Rs. 844.41 Crores have been envisaged for strengthening of infrastructure. Also, Rs 742.18 Crores is estimated for creation/augmentation of network for connecting the unconnected. Apart from that capacity addition is also being undertaken under NERSIP.

Through a planned capacity addition of 542.8 MVA at 33/11 kV level, 174.4 MVA at DT level and creation of additional network of 1285.4 CKM, 4137.14 CKM and 4708.4 CKM of 33 kV, 11 kV and LT lines respectively.

The existing distribution network with projected addition would be adequate under projected peak load conditions but the state has to take necessary steps to complete the planned works within scheduled time period.

The T&D Losses are also projected to be reduced to 25.24% by FY 19 from present level of 32.62% and AT&C to 25.29% by FY 19 from the present level of 34.94%.

FINANCIAL TURNAROUND

MePDCL is showing a net loss of Rs 226 Crores during FY 14 and the accumulated financial losses of MePDCL stands as Rs 694 Crores in FY 14. The accumulated financial losses will increase to Rs. 2248 Crores in the FY 19 in normal circumstances but MePDCL will start earning operating profit by FY 19 through a nominal tariff hike of 15% from FY 17 to FY 19.

However, a hike of 21% every year is required to start earning operating profit in FY 19 if the proposed investments are funded through FIIs/World Bank etc. instead of IPDS and DDUGJY.

On the basis of above considerations, a roadmap to achieve '24x7 Power for All' targets has been formulated and detailed in the report.

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CHAPTER 1: INTRODUCTION

Power sector is a critical infrastructure element for growth of an economy. The availability of reliable, quality and affordable power is vital for rapid growth in agriculture, industry and for overall economic development of a state. For this an efficient, resilient and financially healthy power sector is an essential requirement for growth of a state and economic empowerment of the common man.

Under the Indian Constitution, electricity is a concurrent subject. As per Electricity Act 2003, it is the duty of a distribution licensee to develop and maintain an efficient, coordinated and economical distribution system in the mandated area of supply as well as to supply electricity in accordance with the provisions contained in the Act. The State Electricity Regulatory Commission (SERC), as per the provisions of the act, specifies and enforces the standards with respect to quality and reliability of supply by licensees and also monitors the performance of distribution companies (Licensees) on the basis of notified performance standards.

OBJECTIVES AND KEY OUTCOMES OF THE 24X7 POWER FOR ALL – JOINT INITIATIVE

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

Towards this goal the 24x7 PFA initiative seeks to:

i. Ensure reliable 24x7 supply to consumers within a period of four years of commencement of the program. The hours of supply for agriculture consumers will be decided by the State Government as per requirement.

ii. Ensure that all unconnected households are provided access to electricity in a time bound manner in the next four years i.e. by end of FY 19.

iii. Ensure adequate capacity addition planning and tie ups for power from various sources at affordable price to meet the projected power demand in future.

iv. Strengthen the transmission and distribution network to cater to the expected growth in demand of existing as well as future consumers.

v. Assess the financial measures including optimizing investments and undertaking necessary balance sheet restructuring measures to ensure liquidity in the finances of the utility.

vi. Put in place a strategy to ensure reduction of AT&C losses as per the agreed loss reduction trajectory and methodology and steps required to be taken at every level of distribution.

vii. Identify steps for implementation and adoption of modern technologies to monitor reliability of supply.

viii. Identify steps for monitoring timely commissioning of various generating plants and transmission and distribution infrastructure to meet the expected growth in demand.

ix. To take measures for meeting the

performance standards as laid down by the SERC.

This document is an action plan has been drawn to achieve the above aims and objectives. The plan will be executed by the Meghalaya Government with the support of Government of India, wherever necessary, as per their approved plans, schemes and policies.

METHODOLOGY FOR PREPARATION OF THE ACTION PLAN FOR 24X7 POWER FOR ALL

The plan aims at the following:

(1) bridging the gap between the demand and supply for the already identified/registered consumers and other consuming entities,

(2) connecting the unconnected households and unconnected farm holdings.

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 five years.

2) Projection of demand of commercial, industrial and agriculture consumers based again on past data and historical CAGR recorded during the past five years.

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) Draw up a broad plan to meet power demand in future through

   - ✓ State's own upcoming generation resources.
   - ✓ Allocation from upcoming central sector power plants
   - ✓ Quantum for additional procurement required.

6) Assess the additional energy requirement for providing 24x7 power supply to all households in the state as well as to other consumer categories and determine financial implications on utilities for procuring additional energy and its implication on tariff.

7) Assess the adequacy of the network - both inter-state and intra state transmission as well as distribution so as to meet the increased / expected / projected power requirement of all consumer categories of the state.

8) To incorporate futuristic initiatives like smart grid, energy efficiency measures etc.

9) Conduct sensitivity analysis for cost of service and resulting financial gap under multiple scenarios, namely, tariff hike, reduction in power procurement cost and increase in interest and moratorium period and AT&C loss reduction, etc.

10) Set monitorable targets to achieve the goal of 24x7 Power for All in a cost effective manner to the consumers of the state.

CHAPTER 2: FACTS ABOUT MEGHALAYA

Key Facts	
Constituted on	21st January 1972
As per 2011 Census	
Total Area *- Rural Areas* *- Urban Areas*	**22429 Sq. Km** *- 22,146 Sq. Km (98.74%)* *- 283 Sq. Km (1.26%)*
Administrative Districts	11
No. of Villages *-Inhabited villages*	*- 6459*
Population *- Rural* *- Urban*	**2,966,889** *- 2,371,439* *- 595,450*

Meghalaya was carved out of Assam as an autonomous state on 2nd April 1970 and as a full-fledged state on 21st January 1972. Located in the hills of eastern sub-Himalayas, it is largely a hilly state, having international boundaries with Bangladesh in South and West. It is bounded on the north and east by Assam.

Meghalaya is basically an agricultural state with about 80% of its total population depending entirely on agriculture for their livelihood. Besides the major food crops of rice and maize, the state is also renowned for its horticultural crops like orange, lemon, pineapple, guava, litchi, banana, jack fruit, temperate fruits such as plum, pear, peach etc. Plantation crops like coffee, rubber, black pepper and areca nut are also becoming important. A major breakthrough has been made in tea cultivation and tea gardens have come up in various parts of the state.

The area profile of districts is summarized in Table 41 in Annexure-1. Further, the district wise population details as per 2011 Census is summarized in Table 42 in Annexure-1.

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

1. Generating Company - Meghalaya Power Generation Corporation Limited (MePGCL)
2. Transmission Company - Meghalaya Power Transmission Corporation Limited (MePTCL)
3. Distribution Company - Meghalaya Power Distribution Corporation Limited (MePDCL)

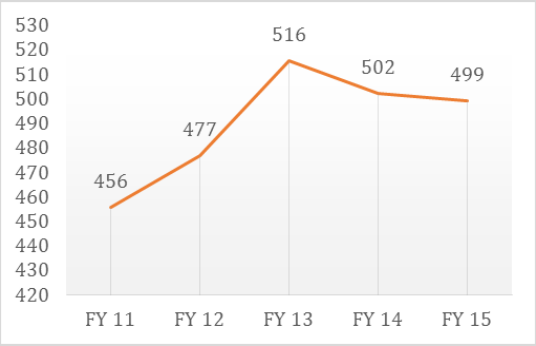
The power sector of state is regulated by Meghalaya State Electricity Regulatory Commission (MSERC).

CHAPTER 3: CONSUMPTION PATTERN AND ELECTRIFICATION STATUS

ELECTRIFICATION STATUS AND PER-CAPITA CONSUMPTION

The population of Meghalaya has grown from 23,18,822 in 2001 to 29,66,889 in 2011 at a decadal CAGR of 2.50%. This growth rate has been considered for estimating the population beyond 2011. Based on the annual energy availability from FY 11 to FY 15, the per-capita consumption of electricity in the period has been as shown below:

Figure 1: Per-Capita Consumption of Electricity (kWh per person) in recent years



- ***The per-capita consumption has shown a declining trend from FY 13 onwards which is primarily due to decrease in industrial sales over the years.***

STATUS OF ELECTRIFICATION AND PROJECTION OF HOUSEHOLDS FOR FY 14

District-wise electrification in urban and rural areas [1] is detailed in Table 48 in Annexure-2.

The summary of electrified and un-electrified households as per 2001 and 2011 census and projections for FY 14 based on CAGR for past 10 years is tabulated below:

Table 1: Projection of households based on Census 2001 and 2011[2]

Particulars	Electrified Households	Un-Electrified Households	Total Households
Total			
2001	1,37,323	2,81,527	4,18,850
in %	*32.79%*	*67.21%*	*100.00%*
2011	2,48,276	2,99,783	5,48,059
in %	*45.30%*	*54.70%*	*100.00%*
CAGR	6.10%	0.63%	2.73%
FY 15 (Projected Households)	**3,17,086**	**2,93,300**	**6,10,386**
Rural			
2001	82,394	2,50,725	3,33,119
in %	*24.73%*	*75.27%*	*100.00%*
2011	1,69,077	2,61,496	4,30,573
in %	*39.27%*	*60.73%*	*100.00%*
CAGR	7.45%	0.42%	2.60%
FY 15 (Projected Households)	**2,25,403**	**2,51,715**	**4,77,118**
Urban			
2001	54,929	30,802	85,731
in %	*64.07%*	*35.93%*	*100.00%*
2011	79,199	38,287	1,17,486
in %	*67.41%*	*32.59%*	*100.00%*
CAGR	3.73%	2.20%	3.20%
FY 15 (Projected Households)	**91,683**	**41,585**	**1,33,268**

[1] *As per the information available in http://censusindia.gov.in/*

[2] *The census information in Primary Census Data abstract (as available with state utilities) is of slight variance from the information available in http://www.censusindia.gov.in. As all the schemes are being formulated by the state government on the basis of primary census data abstract available with them, same information has been used for preparation of this roadmap document.*

From above it is inferred that:

- ***In 2011, 78.56% of the households are in rural areas and 21.44% are in urban areas.***
- ***In 2011, 60.92% households are electrified of which East Khasi Hills district has the highest electrification of 84.52% and West Garo Hills district has the lowest electrification of 42.13%.***
- ***In 2011, 67.41% of urban households are electrified whereas 39.27% of rural households are electrified.***
- ***Overall number of households has grown at a decadal CAGR of 2.73% with urban areas showing higher decadal growth rate of 3.20% as compared to 2.60% in rural areas.***

The above projected figures, derived by extrapolating Census 2011 data, do not match with the records of the state (MePDCL) for FY 15 which shows a very different position. The following table compares the projected number of electrified and un-electrified households based on Census 2011 and as per MePDCL records.

Table 2: Census 2011 vs. MePDCL's Household Data for Meghalaya (Numbers)

Particulars	Electrified HHs	Un-Electrified HHs	Total HHs
Total			
FY 15 (Based on Census)	3,17,086	2,93,300	6,10,386
FY 15 (as per MePDCL)	3,94,785	2,15,601	6,10,386
Rural			
FY 15 (Based on Census)	2,25,403	2,51,715	4,77,118
FY 15 (as per MePDCL)	2,82,185	1,94,933	4,77,118
Urban			
FY 15 (Based on Census)	91,683	41,585	1,33,268
FY 15 (as per MePDCL)	1,12,600	20,668	1,33,268

Following variations were observed in figures submitted by MePDCL and census projections:

a) Against the projections of 3,17,086 electrified households in FY 15, there are 3,94,785 electrified consumers on record of MePDCL, i.e. 2,82,185 consumers in rural areas and 1,12,600 in urban areas.

b) Considering MePDCL submissions and keeping census figures as sacrosanct, there are 2,15,601 households which are un-electrified i.e. 1,94,933 households in rural areas and 20,668 in urban areas.

c) Out of the 1,94,933 un-electrified households, 7643 households are in remote areas.

This anomaly/discrepancy in figures was discussed with MePDCL.

The issue of demand projections for future years was discussed with the state. For the projection of daily household consumption (for the estimation of demand) of both rural and urban consumers in future years, following methodology has been adopted:

(1) The figures of the electrified urban and rural households in FY 15 as given by MePDCL has been considered.

(2) To arrive at the existing un-electrified urban and rural households, the electrified urban households and the electrified rural households have been reduced from the urban and rural households respectively projected for FY 15 based on Census.

Based on the above, the number of electrified and un-electrified households in urban and rural areas of Meghalaya in FY 15 have been arrived at. Accordingly, the demand projections for the state have been worked out in the next chapter.

CHAPTER 4: DEMAND AND SUPPLY SCENARIO

PRESENT POWER SUPPLY POSITION

The actual energy and demand scenario during the past 6 years is shown below:

Figure 2: Energy Requirement vs. Availability[3] (in MU)

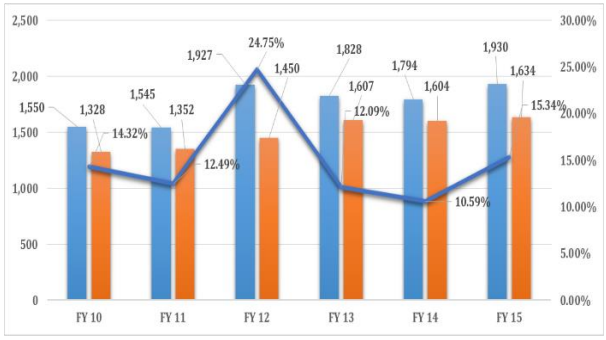
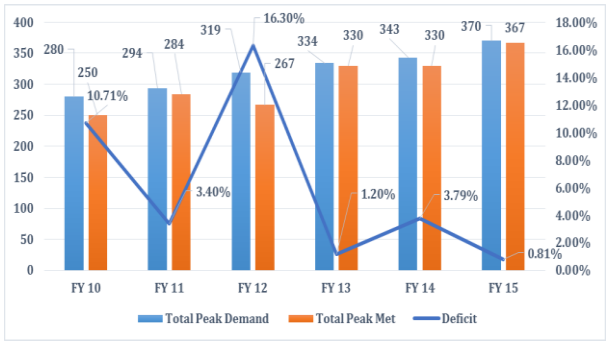


Figure 3: Peak Demand vs. Peak Met (in MW)



- *The peak demand deficit is being progressively bridged by MePDCL.*

The demand has not increased substantially over the years owing to fact that some of the key industries have either closed down or shifted to captive generation/open access.

As per the state, in FY 15, barring a few operational issues, the supply was generally of the order of around almost 24 hours only.

DEMAND PROJECTIONS

The present energy requirement of Meghalaya during FY 15 was 1930 MU. With 24x7 supply to be provided across the state, the demand is likely to increase. The demand can be classified in three broad categories.

(a) Demand on account of 24x7 power supply to already electrified and newly built domestic households

(b) Demand from electrification of un-electrified domestic households.

(c) Demand on account of 24x7 power supply to other than domestic category.

DETERMINATION OF AVERAGE GROWTH RATE IN DAILY HOUSEHOLD CONSUMPTION

The actual daily household consumption of registered rural consumers has increased marginally from 1.93 kWh in FY 11 to 1.95 kWh in FY 15 at CAGR of 0.35% only. On the other hand, the daily household consumption of registered urban consumers has decreased from 6.92 kWh in FY 11 to 6.07 kWh in FY 15.

The broad approach for projection is highlighted below:

(1) The daily household consumption has been computed separately for rural and urban households for FY 15 and escalated by 4% annually in rural and 7% in urban to arrive at the daily household consumption up to FY 19.

(2) As per state, that in urban areas, even though there has been increase in supply hours in

[3] *As per the data available in the CEA*

past few years and the fact that presently electricity is being supplied almost 24 hours to all domestic households, the demand in domestic category is presently still suppressed owing localized capacity constraints, which are targeted to be addressed through various strengthening schemes during this period.

(3) There will not be substantial jump in the rural consumption as the connections already released / being released predominantly consists of BPL category consumers only.

(4) The annual sales in domestic category has been arrived on consideration that the projected households in both rural and urban categories would be consuming electricity at their respective projected daily household consumptions.

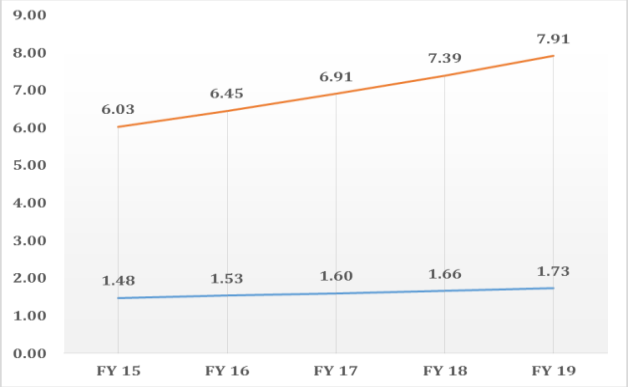
(5) Sales in categories other than household have been considered to increase at the respective CAGRs of past 5 years. However, past trends show no growth in consumption by the industrial sector whence growth rate has been taken as zero for this consumer category.

DETERMINATION OF CONSUMPTION OF HOUSEHOLDS (ELECTRIFIED AND UN-ELECTRIFIED)

The average daily household consumption of existing electrified rural and urban households in FY 15 has been arrived at by dividing the actual sales in rural and urban areas (as per the information provided by MePDCL) by the projected number of electrified rural and urban households in FY 15 respectively.

The projected daily household consumption in urban and rural areas is shown below:

Figure 4: Projected Daily Household Consumption Electricity (kWh per person) for future years



However, it may also be kept in view that the geographical features of the state (i.e. the location, accessibility, weather) along with current tariff levels play a significant role is determining the current and future demands.

The number of electrified households is expected to grow at the decadal CAGR of 2.60% in rural areas and at the decadal CAGR of 3.20% in urban areas.

Also, as 7643 households located in remote areas are being targeted to be covered through off-grid solutions, same has been reduced from the projected un-electrified households.

Also, to electrify the remaining 1,87,290 households in rural areas, phasing of electrification of 5% households in FY 16, 25% households in FY 17, 50% in FY 18 and remaining 20% in FY 19 has been considered.

For electrification of balance 20,668 urban consumers, the pending connections will be released once the strengthening works in the proposed under urban strengthening schemes like IPDS are executed and accordingly phasing of 40% in FY 17 and 60% in FY 18 has been considered

Accordingly, the annual consumption of the domestic households is tabulated below:

Table 3: Projected Sales from Existing and Newly Electrified Households

S. N.	Particulars	FY 15	FY 16	FY 17	FY 18	FY 19
A	**Rural - Electrified Consumers (Existing + Projected Growth)**					
	Electrified Consumers (in Nos.)	2,82,185	2,89,520	2,97,046	3,04,767	3,12,689
	Daily Household Consumption (in kWh)	1.48	1.53	1.60	1.66	1.73
	Projected Annual Consumption (in MU)	152	162	173	185	197
B	**Rural - Electrification of Un-Electrified Consumers**					
	Targeted Annual Addition (in Nos.)	-	9,364	46,822	93,645	37458
	Cumulative Annual Addition (In Nos.)	-	9,364	56,187	1,49,832	1,87,290
	Projected Annual Consumption (in MU)	-	3	19	62	106
C=A+B	**Total Projected Rural Consumption (MU)**	**152**	**165**	**192**	**247**	**303**
D	**Urban - Electrified Consumers (Existing + Projected Growth)**					
	Electrified Consumers (in Nos.)	1,12,600	1,16,205	1,19,925	1,23,764	1,27,726
	Daily Household Consumption (in kWh)	6.03	6.45	6.91	7.39	7.91
	Projected Annual Consumption (in MU)	**248**	**274**	**313**	**373**	**428**
E	**Urban - Electrification of Un-Electrified Consumers**					
	Targeted Annual Addition (in Nos.)	0	0	8,267	12,401	0
	Cumulative Annual Addition (In Nos.)	-	0	8,267	20,668	20,668
	Projected Annual Consumption (in MU)	-	0	10	39	60
F=D+E	**Total Projected Urban Consumption (In MU)**	**248**	**274**	**313**	**373**	**428**
G	**Total Projected Domestic Consumption (In MU)**	**400**	**438**	**505**	**620**	**731**

DETERMINATION OF CONSUMPTION OF OTHER CONSUMERS

For projection of sales for FY 15 to FY 19, the CAGR of previous 5 years has been considered for all categories.

Based on this, the category-wise sales is as per table below:

Table 4: Projected Category-wise Sales (In MU)

Categories	CAGR Considered	Projections			
		FY 16	FY 17	FY 18	FY 19
Domestic Category		438.47	504.76	619.76	731.34
Domestic - Rural		164.74	192.07	246.96	303.12
Domestic - Urban		273.73	312.69	372.80	428.22
LT Category - Other than domestic					
Commercial (CLT)	9.43%	68.49	74.95	82.02	89.76
Industrial (ILT)	0.00%	5.26	5.26	5.26	5.26
Agriculture (AP)	0.00%	0.10	0.10	0.10	0.10
Public Lighting (PL)	0.00%	1.27	1.27	1.27	1.27
Water Supply (WSLT)	6.24%	9.06	9.62	10.22	10.86
General Purpose	16.17%	29.12	33.83	39.29	45.65
Crematorium	0.00%	0.19	0.19	0.19	0.19
HT & EHT CATEGORY					
Water Supply (WS HT)	5.10%	34.06	35.80	37.62	39.54
Bulk Supply	5.45%	86.50	91.21	96.18	101.42
Commercial (CHT)	13.68%	26.20	29.79	33.87	38.50
Industrial (IHT)	0.00%	221.02	221.02	221.02	221.02
Industrial (IEHT)	0.00%	179.60	179.60	179.60	179.60
Assam (33kV)	7.71%	20.55	22.13	23.84	25.68
Grand Total		**1119.89**	**1209.53**	**1350.25**	**1490.18**

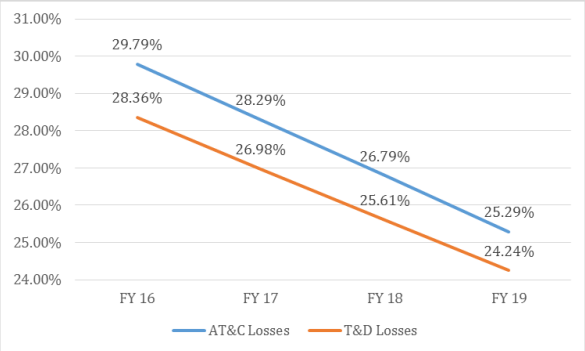
- *As seen from above, the share of industrial sales (LT, HT) will decrease from the 36.24% to 27.24% of overall consumption of the state of Meghalaya whereas the share of domestic sales will increase from 39.15% to 49.08%.*

ENERGY AND DEMAND REQUIREMENT

The trajectory for AT&C loss reduction as per MoP targets has been taken into account for preparing this roadmap document.

Considering the collection efficiency proposed by MePDCL, the T&D and AT&C Loss trajectory is shown below:

Figure 5: Projected Loss Reduction Trajectory



Based on the loss reduction trajectory approved as above, the energy and demand requirement for the future years is tabulated in table 5 below:

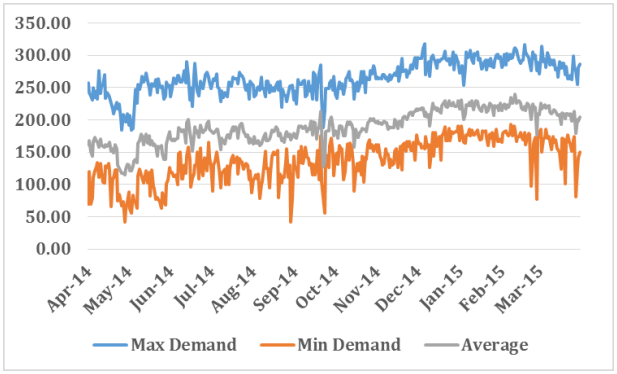
The actual load of 37 MW of open access consumers in FY 15 is projected to remain constant and the peak demand of the state has been accordingly calculated.

The load factor has been taken as 57.50% as considered in 18th EPS.

As seen from the above, the maximum demand requirement of the state is projected to increase from 370 MW in FY 15 to **444 MW in FY 19** assuming an unchanged annual load factor of 57.50%.

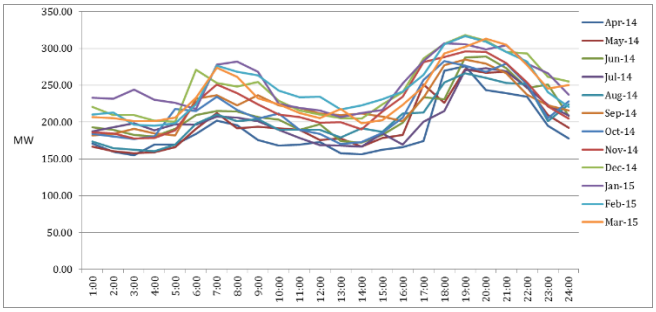
As per projections made in 18th EPS of CEA, the projected energy demand and peak load for the state of Meghalaya was 2059 MU and 505 MW in FY 19 as against the now calculated energy demand of 2049 MU and peak load of 444 MW in FY 19.

Figure 6: Load Curves MePDCL (FY 15)



As seen from above, there is consistently a huge variation in minimum and maximum demand across the year i.e. from about 100 MW to more than 300 MW whereas the average/base demand is about 200 MW only.

Figure 7: Typical Daily Load Curves MePDCL (FY 15)



A close analysis of typical daily curves show that irrespective of seasonal variations, there is peak in the evening hours only which is attributed to the fact that there is substantial impact of lightning load in the evening.

Adoption of various energy efficiency measures like energy efficient irrigation pump-sets, energy efficient lighting (use of LEDs), adopting demand side management initiatives like introduction of Time of Day

(TOD) tariff etc., would also help in reducing the peak demand of the state.

An assessment of the adequacy of generation, transmission and distribution infrastructure for meeting the projected annual energy demand of 2049 MU and peak demand of around 444 MW has been made which is covered in the following chapters.

Table 5: Energy Requirement (In MU) and Peak Demand (in MW)

Particulars	Energy and Demand Scenario			
	FY 16	FY 17	FY 18	FY 19
Energy Requirement within State				
Sale within State	*1,120*	*1,210*	*1,350*	*1,490*
Distribution Losses	28.36%	26.98%	25.61%	24.24%
Intrastate transmission losses	*4.00%*	*4.00%*	*4.00%*	*4.00%*
Total Energy Requirement within State	**1,628**	**1,725**	**1,891**	**2,049**
Load Factor	*57.50%*	*57.50%*	*57.50%*	*57.50%*
Maximum Demand (MePDCL)	**323**	**343**	**375**	**407**
Maximum Demand (Open Access)	37	37	37	37
Maximum Demand (State)	**360**	**379**	**412**	**444**

CHAPTER 5: GENERATION PLAN

CUMULATIVE GENERATION AVAILABILITY

The total installed capacity in Meghalaya including firm share of CGS as on 31st March 2015 (allocated capacity in State, Private, joint and CGS) is 492.47 MW as detailed in table below. Station wise details are at Table 58 in Annexure – 6. Hydro based capacity constitutes about 79% of total capacity followed by gas based 21.2%. In addition to the above capacity, unallocated power from CGS at the disposal of Central Government is allocated to Meghalaya from time to time.

Table 6: Availability Mix from Firm Sources in FY 15 (in MW)

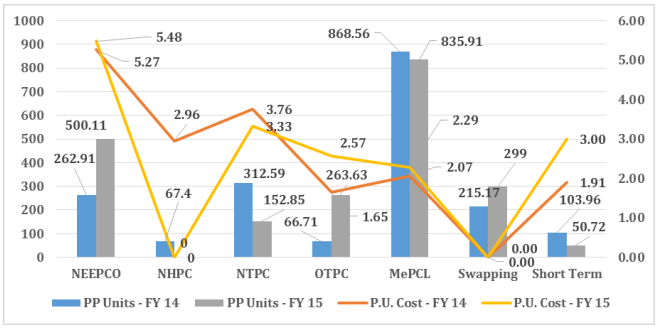
Source	Latest Firm Entitlement in MW	In %age
Availability Within State		
Own Generating Stations		
Hydro	282.00	57.26%
Small Hydro	32.70	6.63%
Total	**314.70**	**63.9%**
Availability Outside State		
Central Generating Stations		
Gas	104.47	21.2%
Hydro	73.30	14.9%
Total	**177.77**	**36.1%**
Grand Total	**492.47**	

Meghalaya has met a maximum demand of 367 MW in FY 15 and the present annual energy requirement of the state is of the order of 1930 MU.

The maximum demand is expected to increase to 444 MW in FY 19 and the energy requirement is projected to rise to 2049 MU in FY 19, taking into account additional energy requirement for providing 24x7 power supply to the state over the normal load growth.

The actual energy availability from various sources in FY 14 and FY 15 is summarized below:

Figure 8: Availability Mix from Various Sources in FY 14 and FY 15 (in MU)



- *During FY 15, about 40% of the power is being sourced from state owned generating stations, whose average rate has increased from Rs. 2.07/unit in FY 14 to Rs. 2.29/unit in FY 15.*
- *Another 44% power is being sourced from CGS whose average rate has increased from Rs.4.04/unit in FY 14 to Rs. 4.29/unit in FY 15*.
- *Since the state is surplus in summer and deficit in winter, it depends on swapping and short term purchase to the extent of 16%.*

PLANNED CAPACITY ADDITION

A number of generating stations (hydro, coal based etc.) are planned to be commissioned up to FY 19. The additional capacity available from various sources (along with the expected year of commissioning) is summarized below:

Table 7: Summary of Additional Firm Availability from Various Sources

Sr. No.	Source	Type	Capacity (MW)	Latest Firm Entitlement		Availability
				%	MW	
	Availability Within State					
A	**New Stations-Own & Private**					
	New Umturu	Hydro	40.00	100.00%	40.00	FY 17
	Ganol	Small Hydro	22.50	100.00%	22.50	FY 18
	Lakroh	Small Hydro	1.50	100.00%	1.50	FY 17
	Riangdo	Small Hydro	3.00	100.00%	3.00	FY 19
Subtotal	**New Stations-Own & Private**		**67.00**	**100.00%**	**67.00**	
B	**Renewable Energy Sources**					
	Solar PP	Solar	20.00	100.00%	20.00	FY 19
Subtotal	**Renewable Energy Sources**		**20.00**	**100.00%**	**20.00**	
	Availability Outside State					
C	**CGS - New**					
	Bongaigaon Stage 1	**Coal**	250.00	7.20%	18.00	FY 16
	Bongaigaon Stage 2	**Coal**	250.00	7.20%	18.00	FY 17
	Bongaigaon Stage 3	**Coal**	250.00	7.20%	18.00	FY 18
	Kameng	**Hydro**	600.00	2.50%	15.00	FY 17
	Pare	**Hydro**	110.00	8.18%	9.00	FY 17
	Turial	**Hydro**	60.00	8.33%	5.00	FY 17
	AGTPP Combined	**Gas**	40.00	3.75%	1.50	FY 16
Subtotal	**CGS - New**		**1560.00**	**5.42%**	**84.50**	

* *Share allocation of some of the CGS is tentative as firm allocation is yet to be done by MoP.*

The table below summarizes the availability of power from various sources including the existing and upcoming capacity availability in FY 19:

Table 8: Projected Firm Share Allocations from Various Sources (in MW)

Sr. No.	Source	Capacity Available in MW			
		FY 16	FY 17	FY 18	FY 19
	Availability Within State				
A	Own Generating Stations	314.70	314.70	314.70	314.70
B	New Stations-Own & Private	0.00	41.50	64.00	67.00
C	R.E. Sources – Solar	0.00	0.00	0.00	20.00
Subtotal	**Availability Within State**	**314.70**	**356.20**	**378.70**	**401.70**
	Availability Outside State				
D	Central Generating Stations	178.30	178.30	178.30	178.30
E	CGS – New	19.50	66.50	84.50	84.50
Subtotal	**Availability Outside State**	**197.80**	**244.80**	**262.80**	**262.80**
Total Availability from firm sources		**512.50**	**601.00**	**641.50**	**664.50**

As seen from above, there is a substantial capacity addition from FY 15 to FY 19 both within state and outside state (based on the latest expected dates of commercial operation as available with Central Electricity Authority).

However, the availability is mostly from hydro and other renewable sources which inherently

have low capacity utilization factor and same has been appropriately factored for computation of energy availability from existing and upcoming generating stations.

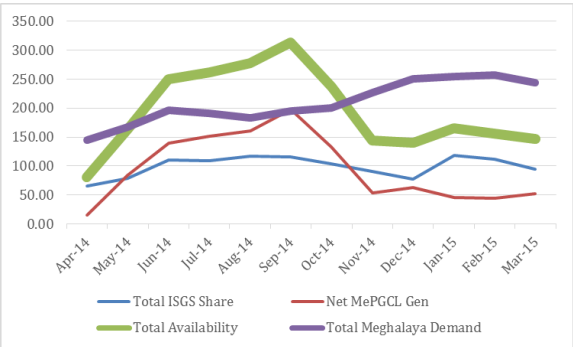
Accordingly, the projected energy availability from the above mentioned sources for future years is summarized in table below.

Table 9: Projected Energy Availability from Firm Share/Long Term Tie-Ups (in MU)

Source	Adequacy of Energy Availability			
	FY 16	FY 17	FY 18	FY 19
Total Energy Requirement within State	1,628	1,725	1,891	2,049
Energy Availability from Long Term Firm Tie-ups	1,937	2,407	2,578	2,629
Energy Availability from Long Term Firm Tie-ups (In %age)	*118.93%*	*139.48%*	*136.33%*	*128.29%*
Targeted Energy Availability from Long Term Firm Tie-ups (In %age)	*90.00%*	*90.00%*	*90.00%*	*90.00%*
Targeted Energy Availability from Long Term Firm Tie-ups (In MU)	1,465	1,553	1,702	1,844
Adequacy of Power Supply	**Adequate**	**Adequate**	**Adequate**	**Adequate**
Additional Energy Required on Long Term Basis (in MU)	**0**	**0**	**0**	**0**
Additional Firm Tie-up Required (80% PLF) on RTC Basis (in MW)	0	0	0	0
Additional Energy Required on Short Term Basis (in MU)	**0**	**0**	**0**	**0**

It is seen from above table that the availability from already tied-up firm share will remain more than 120-140% of the energy requirement.

Figure 9: Demand Supply Curve (FY 15)



However, it can be seen from above that typically, the state is surplus in summer and deficit in winter, as is the case of most states which have substantial share of hydro generation. Thus, while the state may see shortfall during winter months, same will be covered through banking/swapping the surplus power available in summer months.

For the purpose of determining the adequacy of energy availability, it is considered that the state should be able to meet 90% of its projected energy requirement through firm allocations/tie-ups only and for the balance 10%, the state has to effectively plan (through comprehensive power procurement planning on short term and medium term basis) and look for procurement of power either through competitive bidding or power exchange or through other sources on short term/medium term basis.

As Meghalaya will be having projected energy availability of more than 100% through firm share in FY 19, the state has to just optimize the power purchase and sale planning.

There is no requirement of purchase through short term power as of now.

It is also worth mentioning that the firm tie-ups do not include the availability from the unallocated quota of existing as well as upcoming Central Generating Stations,

which will be additionally available and can also be availed by Meghalaya.

FUND REQUIREMENT

The fund requirement for state projects is summarized below:

Table 10: Fund Requirement for State Generation Projects (in Rs Crores)

Sl. No.	Category	Fund Requirement (in Rs Crores)				
		FY 16	FY 17	FY 18	FY 19	Total
1	Own Generation	271	16	10	0	**297**
2	R&M of Existing Stations	7	53	13	4	**77**
	Total Fund Requirement (Generation)	**278**	**69**	**23**	**4**	**374**

ACTION POINTS FOR THE STATE

OPTIMIZED POWER PURCHASE AND SALE PLANNING

As seen from previous sections, there is considerable surplus (20%-30%) available with the state. The state needs to optimize its power purchase and should look forward for selling the surplus power to prospective deficit states so as to earn revenue for the state.

GOVERNMENT OF INDIA INTERVENTION

The issues highlighted by the state for intervention of Government of India are detailed as follows:

RM&U OF UMIAM STAGE-III

The Umiam Stage III with installed capacity of 60MW (2x30MW), was commissioned in 1979. The Plant has developed serious troubles due to deterioration of turbine parts in view of aging. The generation of energy has been declining in recent years and forced shutdown has become the order of the day. Resolving the problems and recovering the performance of the Plant by implementing the renovation and modernization (R&M) for Umiam Stage III HEPP has become a pressing issue in the state.

The CEA has vetted the cost for the Project at Rs. 408 Cr. The cost submitted by the MePGCL is Rs. 411 Cr. The difference of Rs 3 Cr. from that vetted by CEA, is just in the IDC portion.

The Proposal has already been submitted by the MoP, GoI to the Department of Economic Affairs, Government of India. DEA is requested to speed up the process, so that the RM&U can be taken up at the earliest so as to cope up with the demand in the peak hours in the State.

COORDINATING WITH OTHER CENTRAL AGENCIES/STATE GOVERNMENTS FOR APPROVAL/CLEARANCES

Ministry of Power, GoI is requested to take up the matter of environment clearance of 240 MW (3 x 80) UMNGOT HEP with MoEF.

The EIA&EMP reports has been completed and environmental clearance have been applied from MoEF. The application was accepted by them and was placed as one of the Agenda to be discussed during the 78th meeting of the Expert committee on 16th & 17th October, 2014. But before the discussion could take place, the application was rejected outright on the ground that Public

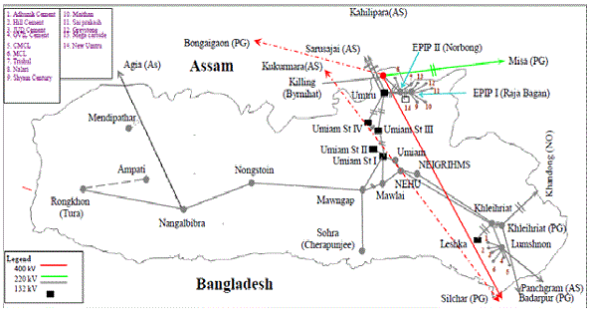
hearing was conducted 20 days after the validity of the TOR which expired on 31st March, 2012. (The MoEF requested the State Government to apply for fresh TOR). The public hearing was conducted on the 20th and 24th April, 2012 due to unavoidable reasons. It may be mentioned that before expiring of validity date, two applications were written to MoEF requesting for extension of the validity of the TOR, but no response were received from the Ministry.

In order to avoid delay in preparation of fresh EIA & EMP reports, it is requested that the MoP, GoI, take up the matter with MoEF, GoI to accept the already prepared EAI&EMP reports and to grant the necessary Environmental Clearance; so as to enable the State to take up the Project for the interest of the State in particular and the country in general.

CHAPTER 6: TRANSMISSION PLAN

POWER MAP OF MEGHALAYA

Figure 10: Power Transmission Map of Meghalaya



EXISTING INTER-STATE TRANSMISSION SYSTEM (ISTS)

Meghalaya transmission network is highly interconnected with the neighboring Assam network. Following inter-state transmission substations serve Meghalaya in addition to serving Assam.

i. *Killing :400/220kV : 2x315MVA*

ii. *Killing: 220/132kV : 2x160MVA*

iii. *Agia: 220/132kV(Assam): 1x100MVA*

iv. *Sarusajai(Assam) : 1x100MVA*

In addition, the transmission network of Meghalaya is interconnected with the Assam network at 400 kV (Killing – Bongaigaon, Killing - Silchar), at 220 kV (Killing – Misa), and at 132 kV (Khliehriat(PG) – Badarpur (PG), Khliehriat (Meghalaya) –Panchgram (Assam), Khliehriat (Powergrid) –Khandong D/c (NEEPCO) and Umtru HEP - Kahelipara) as can be seen from the **Table 53** in Annexure – 3.

The existing transformation capacity available at 400 and 220 kV for import from the north-eastern grid is **1150 MVA** (Table 54 in Annexure – 3). This transformation capacity serves both Assam and Meghalaya. However as the maximum import, in the unlikely scenario of nil own generation, will be 370 MW or 412 MVA, the available transmission system is just adequate to meet the power supply requirement of Meghalaya during low hydro generation.

PLANNED INTER-STATE TRANSMISSION SYSTEM (ISTS)

Four 132 kV lines have been planned by MePTCL for evacuating power from upcoming generation projects and for strengthening inter-state transmission capacity.

The additional transmission lines totaling 112.72 Ckt-km at an estimated cost of Rs. 62.71 Crores have been planned by MePTCL to enhance the transmission capacity.

The target date of commissioning of these transmission lines is spread between August 2015 and March 2018. Additional transmission capacity so created will be adequate to meet the increased demand on the inter-state transmission lines till the year FY 19. The details are shown in Table 51 at Annexure – 3.

However as the maximum import, in the unlikely scenario of nil own generation will be 444 MW or 494 MVA, the available capacity is adequate to meet the maximum power Meghalaya needs to import when low hydro generation and peak demand conditions are coincident in FY 19.

Accordingly, no new interstate substation has been planned in Meghalaya.

EXISTING POWER EVACUATION & INTRA STATE TRANSMISSION SYSTEM

The existing intra-state transmission network for evacuation and transfer of power within the state is mainly at 132 kV level. Presently the state has 807.58 Ckt. Km of intra-state lines at 132 kV level which are more or less adequate to meet the present peak requirements of the state.

The aggregate capacity at 132/33 kV is 465 MVA (details as per Table 56 of Annexure-3). The above capacity is generally adequate to meet the present peak requirements of the state.

INTRA-STATE TRANSMISSION SYSTEM PLANNED UP TO FY 19

A total of twelve new 220 kV & 132 kV lines totalling 580.114 Ckt. Km are planned to be installed for strengthening of intra-state transmission network to meet the projected peak demand of 444 MW in FY 19 at an estimated cost of Rs. 131.80 Crores.

The lines are scheduled to be commissioned between October 15 and March 19.

Table 52 in Annexure – 3 shows details of transmission lines planned for system strengthening.

Transformation capacity of 640 MVA is planned to be added at Mawngap and New Shillong by March 19.

A total of 625 MVA additional transformation capacity by way of new 132/33 kV transformers scheduled to be commissioned between October 15 and March 19 at an estimated cost of Rs. 191.88 Crores. The details are shown in the **Table 50** in Annexure-3.

Applying a diversity factor of 1.2 and power factor of 0.9 and assuming all transformers have their individual maximum demands proportional to their ratings, it results in 54% loading of transformers.

NORTH EAST REGION POWER SYSTEM IMPROVEMENT PROJECT (NERPSIP)

The Government of India (GoI) has formulated a plan for undertaking investments in Transmission & Distribution in North East Region (NER) to facilitate increased availability of power, improvement in service delivery and reduction of system losses. Presently, six NER States (Assam, Manipur, Mizoram, Meghalaya, Tripura and Nagaland) are connected to transmission network at 132 KV and below. In order to reduce the gap between the requirement and availability of the intra-state transmission and distribution system, it was found necessary to provide 132 KV / 220KV connectivity to all these NER states for proper voltage management and loss reduction. Implementation of this project will create a reliable State power grid and improve its connectivity to the upcoming load centres, and thus extend the benefits of the MePTCL grid connected power to all the consumers.

The project includes capital investments for strengthening/ augmentation of the intra-state transmission and distribution network as well as capacity building across selected six North East states of Assam, Manipur, Mizoram, Meghalaya, Tripura and Nagaland.

The North East Region Power System Improvement Project (NERPSIP) is a comprehensive scheme to be funded by World Bank and Government of India. The scheme comprises of development of Transmission, Sub-Transmission/ Distribution system up to 33 KV.

Within Meghalaya, the objective of scheme is to revitalize the power sector to achieve sustainable development in long term.

The NERPSIP is expected to be undertaken through funding in three tranches. The addition of new substations and construction of new lines is required for relieving the existing overloaded lines and substations catering to Shillong, areas of Khasi Hills and Garo Hills districts. The added capacity is also required for catering to growing demand throughout the state.

The works covered under Tranche I are broadly highlighted in the following table:

S. N.	Work	Rating	Unit	Capacity Addition
1	Substations	132/33 KV	MVA	300
2	Substations	220/ 132 KV	MVA	640
3	Transmission lines	220 KV	CKm	244
4	Transmission lines	132 KV	CKm	172

SYSTEM ANALYSIS UNDER PEAK DEMAND OF 444 MW IN FY 19

GENERAL

Results of load flow study will be required to assess the adequacy of the power drawal by the state corresponding to FY 19 condition.

FUND REQUIREMENT

The fund requirement for state projects is summarized below:

Table 11: Fund Requirement for State Transmission Projects (in Rs Crores)

Sl. No.	Category	Fund Requirement (in Rs Crores)				
		FY 16	FY 17	FY 18	FY 19	Total
1	Inter State - Transmission Lines	26	0	37	0	**63**
2	Intra State - Transmission Lines	61	0	15	56	**132**
3	Inter State - Substations	0	0	0	0	**0**
4	Intra State - Substations	75	69	25	23	**192**
5	NERPSIP	777				**777**
	Total Fund Requirement (Transmission)	**162**	**69**	**77**	**856**	**1163**

ACTION POINTS FOR THE STATE

- State will implement the projects as listed on time to ensure availability of transmission system for 24 x 7 supply and will monitor the loading of lines and substations on periodic basis keeping in view the actual growth in loading of the load centers along with changes in consumer mix.
- The state will procure and deploy one Emergency Restoration System (ERS) to effectively restore transmission lines in case of emergency.
- The state will look for options for construction of new lines through tariff based competitive bidding (TBCB) route.

CHAPTER 7: DISTRIBUTION PLAN

CONNECTING THE UNCONNECTED HOUSEHOLDS

As per the state, the district wise electrification plan is as follows:

Table 12: Targeted Electrification under various schemes (Grid Connected)

District	Electrification Target Grid Connected	
	Households	Villages
East Khasi Hills	44,633	118
Jaintia Hills	20,957	62
Ribhoi	12,719	94
South Garo Hills	12,953	71
West Garo Hills	62,038	80
West Khasi Hills	19,190	213
East Garo Hills	35,469	257
Total	**2,07,958**	**895**

As seen from above, the state proposes to electrify a total of 2,07,958 households. Out of these, 1,87,290 households are proposed to be covered with electrification of 895[4] villages. Further, 20,668 households are proposed to be electrified in urban areas.

Table 13: Targeted Electrification under various schemes (Off-Grid)

District	Electrification Target -Off Grid		
	Households	Villages/Hamlets	
		MNREDA	MePDCL[5]
East Khasi Hills	575	38	0
Jaintia Hills	1,357	26	7
Ribhoi	2,027	45	2
South Garo Hills	12	1	0
West Garo Hills	278	4	0
West Khasi Hills	2,750	85	8
East Garo Hills	642	20	0
Total	**7,643**	**219**	**17**

Further, 7,643 households are in remote areas and are being covered through off-grid solutions.

Out of the 219 villages/hamlets, MNREDA has already electrified 134 villages. Proposal for electrification of remaining villages is already in active perusal with MNRE.

The remote villages /habitations would also be identified by the state which may be electrified under DDG schemes or various schemes of MNRE as given in Annexure – 5.

EXISTING DISTRIBUTION SYSTEM

MePDCL is the only distribution licensee in the state of Meghalaya. It is serving more than 3.94 lakh consumers of the state and providing 20-24 hours supply to all the consumers in spite of hilly terrain and difficult areas in the state. Meghalaya, in fact, is a special category state having hilly terrain of which 65% is covered by forest and the population is very thin in far-flung areas.

A snapshot of the existing distribution system serving Meghalaya is given below.

[4] Earlier the number of villages identified as un-electrified was 1142. However, after actual field survey, it was observed that out of 535 virgin villages, 56 have been electrified under RGGVY; out of 607 un-electrified villages as per REC definition, 174 villages have also been electrified under RGGVY and other schemes (PMGY, RE-MNP etc.). Moreover, the names of 3 villages were found to be duplicated. Hence, the actual number of un-electrified villages is 909 out of which 895 villages are proposed to be electrified through grid.

[5] Out of the 909 un-electrified villages mentioned above, 14 villages are proposed through off grid. Apart from that 3 (three) villages in Jaintia Hills District, namely Huroi, Hingaria and Mulasei, for which DDG had been sanctioned under 12th Plan RGGVY.

Table 14: Existing Distribution System as on March 2015

Particulars	Qty.
Electricity Consumers	3.94 Lacs
Connected Load	763 MW
Peak Demand	370 MW
33/11 KV Sub-stations	116 No.
Capacity of 33/11 KV Sub-stations	381 MVA
33 KV Line	1932 Km.
11 KV Line	12385 Km.
LT Line	17781 Km.
11/0.4 KV DTR	8241 No.
Capacity of 11/0.4 KV DTR	598 MVA

INVESTMENTS PROPOSED FOR URBAN AND RURAL INFRASTRUCTURE

FOR URBAN INFRASTRUCTURE

The earlier R-APDRP scheme covered 9 towns in Meghalaya. The total outlay of the scheme for Meghalaya was Rs. 33.97 (Part-A) and Rs. 159.73 Crores in (Part-B), out of which Rs. 10.21 Crores and Rs. 47.92 Crores has been disbursed respectively.

The new IPDS proposal aims to cover 12 New Towns apart from additional augmentation works in the existing R-APDRP towns.

The state has now accessed the requirement of strengthening of urban infrastructure and accordingly proposed work amounting to Rs 510.61 Crores to be undertaken under the new IPDS scheme which is summarized in Table 15 below.

Table 15: Work proposed for strengthening of Urban Infrastructure

S. No.	Item	Unit	Quantity	Cost (Rs Crores)
1	33/11 KV or 66/11 KV SS : New /Additional Tr	MVA	103	62.92
	33/11 KV or 66/11 KV SS : Capacity Enhancement	MVA	73.75	36.69
2	33/11 KV or 66/11 KV SS : R&M	Nos.	29	17.87
3	New 33 KV feeders- New	Km	100.5	29.59
	33 KV feeders- Bifurcation/ Augmentation	Km	112	19.87
	33 KV feeders- Reengineering	Km	189.2	15.18
4	33 kV Bay extension	Nos.	8	3.1
5	New 11 KV feeders- New	Km	387.09	48.68
	11 KV feeders- Bifurcation/ Augmentation	Km	118.9	6.78
	11 KV feeders- Reengineering	Km	179.4	7.76
6	Distribution Transformer-New	MVA	31.68	13.7
7	Distribution Transformer-R&M	Nos.	562	15.14
8	Capacity enhancement of LT sub-station	MVA	55.12	15.61
9	LT Line : New Feeder/	Km	541.98	36.91
	LT Line : Feeder Bifurcation/Augmentation	Km	610.75	22.06
	LT Line : Re-engineering	Km	103	1.41
10	HVDS	Nos.	77	11.84
11	Capacitor Bank	MVAR	85	11.75
12	Aerial Bunched Cables	Km	279.52	13
13	Under-ground cables	Km	10	41.18
14	Solar Panels with Net metering (in Government establishment)	KW	3604	43.25
15	Metering - Feeder	Nos.	52	1.22
	Metering - Boundary Point	Nos.	74	1.16
	Metering - DT	Nos.	403	0.8
	Metering - Consumer	Nos.	5148	1.07
	Metering-3Phase	Nos.	2400	1
	Metering 1 Phase	Nos.	11115	2.86
16	Prepaid meter 3 Phase	Nos.	3385	6.44
	Prepaid meter 1 Phase	Nos.	28450	20.21
	Smart Meters	Nos.	300	1.2
	Grand Total			**510.61**

FOR RURAL INFRASTRUCTURE

The earlier RGGVY scheme covered all districts of Meghalaya. The revised sanctioned cost of the scheme was Rs. 459.17 Crores. The scheme being implemented with progress as on 31/05/2015 has been summarized below:

1. 1842 out of 1867 un-electrified villages (99% completed)
2. 2947 out of 3090 intensive electrification of villages (95% completed)
3. 1.04 lakh out of 1.09 lakh BPL Household Connections (95% completed)

4. 1508 out of 1842 villages energized (82% completed)

5. Rs. 406.37 Crores out of Rs. 459.17 Crores disbursed (89% completed)

The issues being faced in implementation rural electrification is as follows:

1. **Delay in commissioning of sub-stations**: 3 substations are pending

    a. South Garo Hills-One S/S Rangora, work completed but forest clearance awaited due to non-deposition of NPV charges for other than RGGVY project. Matter is under discussions.

    b. East Garo Hills-2S/S (Sangsok & Samanda) are pending due to forest clearance issues.

2. **Gap in Energization**: Energization of 334 villages pending due to inadequate man power for maintenance of distribution network.

3. **Remittance of interest earned on subsidy:** MePDCL has reported a sum of Rs. 14.49 Crore as interest earned on subsidy component till 31.03.2014, which is pending for remittance to Ministry of Power. MePDCL has requested for adjustment in final claims.

4. **DDG:** NIT issued for all 3 sanctioned projects but yet to be awarded.

The state envisages that there is requirement for connecting the unconnected and strengthening of rural infrastructure and has accordingly accessed and proposed work amounting to Rs. 1,586.59 Crores to be undertaken under the DDUGJY scheme against following components:

1. Feeder Segregation:

Rs 0.00 Crores

2. Strengthening of Rural Infrastructure:

Rs 844.41 Crores

3. Connecting the Unconnected:

Rs. 742.18 Crores

It is evident from above that for households, the state plans to spend, on an average, Rs 39,500/- per household for connecting these households.

The component wise details of proposed DDUGJY scheme is mentioned in Table 57 in Annexure 4.

Table 16: Work proposed for Rural Infrastructure Augmentation and connecting the unconnected.

Item	Total Amount in Rs. Crores
33 kV WORKS	283.24
R&M works in existing 33/11 KV substations	13.04
11 kV Transmission Works	715.99
11 kV Transformation Works	106.01
Distribution Transformer-R&M	28.37
LT Distribution Works	365.12
Capacitor Bank	0.03
11 kV feeder metering	5.33
Meter at Distribution Transformer	31.46
Consumer	38.00
Grand Total	**1586.59**

As seen from above, the given the aging network of state, along with huge number of unconnected households, the state requires a massive investment of Rs 1,586.89 Crores in rural infrastructure.

NORTH EAST REGION POWER SYSTEM IMPROVEMENT PROJECT (NERPSIP)

The Government of India (GoI) has formulated a plan for undertaking investments in Transmission & Distribution in North East Region (NER) to facilitate increased availability of power, improvement in service delivery and reduction of system losses. Presently, six NER States (Assam, Manipur, Mizoram, Meghalaya, Tripura and Nagaland) are connected to transmission network at 132

kV and below. The 33 KV network is the backbone of power distribution system in these states. In order to reduce the gap between the requirement and availability of the intra-state transmission and distribution system, it was found necessary to provide 132 kV / 220 kV connectivity to all these NER states for proper voltage management and loss reduction. Similarly, the distribution system which mainly relies on 33 kV network would be strengthened substantially.

Implementation of this project will create a reliable state power grid and improve its connectivity to the upcoming load centres, and thus extend the benefits of the grid connected power to all the consumers. The project includes capital investments for strengthening/ augmentation of the intra-state transmission and distribution network as well as capacity building across selected six North East states of Assam, Manipur, Mizoram, Meghalaya, Tripura and Nagaland. The North East Region Power System Improvement Project (NERPSIP) is a comprehensive scheme to be funded by World Bank and Government of India. The scheme comprises of development of Transmission, Sub-Transmission/ Distribution system up to 33 kV.

Within Meghalaya, the objective of scheme is to revitalize the power sector to achieve sustainable development in long term. The NERPSIP is expected to be undertaken through funding in three tranches. The addition of new substations and construction of new lines is required for relieving the existing overloaded lines and substations catering to Shillong, areas of Khasi Hills and Garo Hills districts. The added capacity is also required for catering to growing demand throughout the State. The works covered under Tranche I are broadly highlighted in the following table:

Table 17: Work proposed under NERPSIP.

S. N.	Work	Rating	Unit	Capacity Addition
1	New Substations	33/11 kV	MVA	115
2	Augmentation of Substations	33/11 kV	MVA	30
3	Construction of lines	33 kV	Ckt. Km	198
4	Reconductoring of lines	33 kV	Ckt. Km	65

INDO BANGLADESH BORDER FLOOD LIGHTING

The scheme for Indo Bangladesh Border Lighting project has been envisaged by the Government of Meghalaya keeping in view the security requirement for 440 km long border shared between Meghalaya and Bangladesh. The Project is being financed by the Ministry of Home Affairs, Government of India as Deposit Work Scheme. As the project extends across several districts and corresponding divisions of MePDCL, the work has been split among the various divisions for better execution. The RE (Rural Electrification) Construction Division for Shillong, Jowai and Tura will undertake the work for the portion in East/ West Khasi Hills, Jaintia Hills and West/ South Garo Hills respectively. Currently the bid evaluation for turnkey execution of project is in progress.

In the first phase of project, the scheme shall be implemented in East & West Khasi Hills. The break-up of works is highlighted as below:

Table 18: Work proposed for Rural Infrastructure Augmentation and connecting the unconnected.

District(s)	Total Amount in Rs. Crores
Shillong Sector	29.55
Tura Sector	22.00
Williamnagar Sector	21.92
Jowai Sector	22.74
Total	**98.65**

Currently the Scheme in Shillong, Tura and Williamnagar Sector has been sanctioned and yet to be sanctioned in Jowai Sector. The Selection of supplier is in progress and works are expected to begin shortly.

GREEN CITY PROJECT- SOLAR STREET LIGHTING

The Green City Project for Shillong & Tura originally envisages replacement of street lights by the Solar LED Street Lighting System in two phases. For the 1st phase 640 locations in Shillong and 160 locations in Tura were identified for replacement of existing street lighting system. The project involves installation of a 56 W Solar (LED based) Street lighting system at a height of 7 meters with a pole spacing of 20 meters to provide an equivalent light intensity as those of HPSV/HPMV 250W Street light. The expected benefit of the project (both phases) shall be saving of approximately 0.45 MU on consumption of power by Street Lights.

The total estimate for both the phases the Solar lighting project is Rs. 25 Cr and will be funded by 90% Equity and 10% Loan to be received from State Government.

The first phase work for installation of 56 W LED Based Solar Street Lighting Systems of 300 Nos. and 78 Nos at Shillong (East Khasi Hills District) and Tura (West Garo Hills District) was completed at an executed cost of Rs. 5 Cr.

ASSESSMENT OF ADEQUACY OF DISTRIBUTION SYSTEM

AT 33/11 LEVEL

The transformation capacity at 33/11 kV level is projected to grow from 381.91 MVA in FY 15 to 924.71 MVA in FY 19.

The peak demand of the state, including demand of large industrial consumers at 33 kV level, has been recorded at 370 MW in FY 15.

The billed maximum demand of 10 nos. EHT consumers is about 70 MVA and of 5 nos. HT consumers at 33 kV is 10.24 MVA. Thus, the peak demand of direct 33 kV and above consumers works out to be 80 MVA or 72 MW (considering a power factor of 0.9). Thus, a demand of 298 MW (=370-72) is met at 11 kV and below which corresponds to 331 MVA considering a power factor of 0.9.

Against this peak demand, the aggregate installed capacity of 33/11 kV substations available in the state is 381.91 MVA. This translates to an average loading of 86.67% on 33/11 kV transformers under peak demand conditions which is very high.

Following similar logic and taking the projected peak demand of 444 MW in FY 19 and assuming the proportion of demand met at 33 kV in relation to the total peak demand remains the same as at present, the contribution of 33 kV direct consumers to the peak demand of the state comes to 74 MW.

Correspondingly, the demand met at 11 kV and below comes to 370 MW (=444-74) which corresponds to 411 MVA considering a power factor of 0.9. Against this peak requirement, the installed capacity of 33/11 kV transformers in FY 19 is projected at 924.71 MVA. This translates to an average loading of 44% on 33/11 kV transformers under peak demand conditions.

AT 11/.04 KV LEVEL

The existing aggregate 11/ 0.4 KV distribution transformer capacity of MePDCL is about 598.59 MVA in FY 15.

Further, an additional transformer capacity of 184.33 MVA is planned to be added by FY 19 under various initiatives which will result

in overall distribution transformation capacity of 782.92 MVA by FY 19.

Given that the billed maximum demand of 210 nos. 11 kV consumers totals around 37.527 MVA or 42 MW (considering a power factor of 0.9). This leaves a demand of 256 MW (=298-42) to be met at LT (415V) level which corresponds to 285 MVA considering a power factor of 0.9.

Against this peak demand, the aggregate installed capacity of DT transformers in the state is 598.59 MVA. This translates to an average loading of 47.61% on distribution transformers under peak demand conditions.

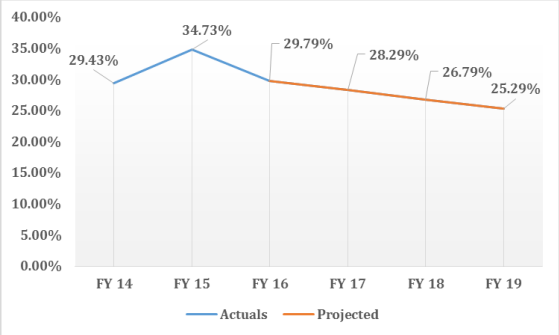
Following the same logic and taking the projected peak demand of 444 MW in FY 19 and assuming the proportion of demand met at 11 kV in relation to the total peak demand remains the same as at present, the contribution of 11 kV direct consumers to the peak demand of the State comes to 44 MW.

Correspondingly, the demand met below 11 kV comes to around 326 MW (=370-44) which corresponds to 362 MVA considering a power factor of 0.9. Against this peak requirement, the installed capacity of distribution transformers in FY 19 is projected at 772.94 MVA. This translates to an average loading of 46.83% on distribution transformers under peak demand conditions.

AT&C LOSSES

The actual and projected AT&C losses is summarized below:

Figure 11: AT&C Losses over the years



The AT&C losses which were order of 29.43% in FY 14 and have increased to 34.73% in FY 15 primarily due to the fact that the HT and EHT industrial sales have decreased over a period of time. The state is undertaking a number of steps such as energy audit and assessment of base level loss, Intensification of Vigilance, Metering of Consumers, online payment mechanism, tie-up with Common Service Centre for collection of revenue, defective meter replacement, replacement of mechanical meters, metering of unmetered connections and introduction of prepaid meters etc.

The state further plans to reduce the losses up to 25.29% by FY 19 with the help of existing measures as well as initiatives being taken under R-APDRP such as energy auditing etc. and new initiatives planned under IPDS.

IT INITIATIVES TAKEN BY MEPDCL

In Meghalaya, IT adoption on a massive scale is being pursued in the following areas:

- ✓ The RAPDRP Part-A implemented by MePDCL covers the following:
  - (1) Consumer Indexing.
  - (2) GIS Mapping
  - (3) Metering of DT and Feeders
  - (4) Automatic Data logging for all the DT and Feeders
  - (5) SCADA/DMS System

(6) AMR for all HT Consumers

- ✓ Integration of provision of online bill payment.
- ✓ Computerization of billing of rural consumers has been completed.
- ✓ Payment of electricity bills at Common Service Centres under the special purpose vehicle (CSC-SPV), which has already commenced and is supported by BASIX
- ✓ Introduction of prepaid meters.
- ✓ Automated Meter Reading (AMR) of industrial HT Consumers in Byrnihat by using available SCADA through Idea Mobile Network.
- ✓ A dedicated IT Cell under MIS Division of Commercial Wing has been setup to take up and co-ordinate the aforesaid works. This cell is also entrusted with maintenance of the assets (both software and hardware) created in 9 towns.
- ✓ MeECL has nominated ACE (Commercial) as Chief Information Security Officer with the following nodal officers.

(1) GENCO – SE (Gen. Circle II)

(2) TRANSCO – SE (SLDC)

(3) DISCOM – SE (Energy Mgmt.)

IT Initiatives to be taken by MePDCL for consumer satisfaction and meeting the performance of Standards specified by SERC:

- ✓ End to end 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.
- ✓ In order to curb the malpractices being done at the level of meter readers while entering the meter reading of the consumers it has been planned to adopt the "**Mobile Based Photo Meter Reading & Billing System**"
- ✓ Centralized Information & Monitoring System for operational, enforcement & litigation, vigilance activities and analysis has to be operationalized.
- ✓ Power management would require 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 very useful for improving reliability and reduction of network downtime.
- ✓ Requirement of Regional Distribution Control Centers (RDCC) within the State will be identified in view of upcoming projected load. These will initially cater to the principal load centers, but would thereafter be expanded to all load centers of the state. This will be a key initiative, not only for effectively managing 24x7 supply, but also thereafter for other functions like forecasting.
- ✓ **Power procurement planning and optimization tools will be implemented to reduce the power procurement costs and improve supply reliability which will be achieved through the institution of technically robust forecasting,**

scheduling and dispatch (Unit Commitment) and settlement tools.

- ✓ 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.
- ✓ Government of Meghalaya may also seek funding under National Smart Grid Mission (NSGM) for development of Smart cities in the state.

The above measures, need to be implemented on priority basis by MePDCL for more consumer satisfaction in the state.

FUND REQUIREMENT

The fund requirement for state projects is summarized below:

Table 19: Fund Requirement for Distribution Projects (in Rs Crores)

Sl. No.	Category	Fund Requirement (in Rs Crores)				
		FY 16	FY 17	FY 18	FY 19	Total
1	IPDS	51	306	153	0	**511**
2	DDUGJY	159	952	476	0	**1587**
3	NERSIP	71	53	36	18	**178**
4	Other Schemes	184	93	0	0	**278**
	Total Distribution	**465**	**1405**	**665**	**18**	**2553**

ACTION POINTS FOR STATE

The state **may revisit the overall plan for augmentation of distribution network** keeping in view of the increased load projections with overall system peak load of 444 MW and would take necessary steps to meet the Performance of standards specified by SERC.

GOVERNMENT OF INDIA INTERVENTION

In order to ensure reliable and secure 24x7 quality power supply to all, the state requests that the investment sought under IPDS and DDUGJY needs to be sanctioned expediently by PFC/REC**.**

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

CHAPTER 8: RENEWABLE ENERGY INITIATIVES

ACHIEVEMENTS IN RENEWABLE ENERGY

The achievements in Renewable Energy is tabulated below:

Table 20: Cumulative achievements (as on 30.06.2015)

Sources/Systems	Cumulative Achievements
Grid Power	
Small Hydro Power (MW)	32.70
Decentralized/Off-grid Renewable Energy Systems	
Biomass Gasifier (MW)	0.25
Biomass Power/Cogeneration (MW)	13.80
Solar Lightning System (Nos. in Lakh)	0.34
Solar Pumps (nos.)	19.00
Solar Power Packs (kWp)	1100
Aerogen/ Hybrid systems (kW)	191.50
Biogas Plant (Nos. in lakh)	0.10
Remote Village Electrification (No. of villages and hamlets)	134

RENEWABLE ENERGY POLICIES IN THE STATE

MEGHALAYA POLICY FOR PROMOTING GENERATION OF POWER THROUGH NON-CONVENTIONAL ENERGY SOURCES

Meghalaya Non-Conventional and Rural Energy Development Agency (MNREDA), as a state nodal agency for developing and promoting used of non-conventional energy production and use in the state of Meghalaya, shall facilitate clearances for the projects for producing electricity from Non-Conventional Sources at the State and Central levels on the lines of facilitation provided by Bureau of Industrial Promotion (BIP). MNREDA shall also facilitate grant of loans to such projects by Indian Renewal Energy Development Authority (IREDA) and subsidies by the Ministry of Non-Conventional Renewable Energy (MNRE).

Incentives Offered:

i. The producer will be allowed to use the water for power generation. Royalty on the water used for small Hydro Projects will be charged as admissible.

ii. Infrastructural facilities such as approach roads, water supply, crane, power during construction period etc. will be provided on the lines of industrial estates.

iii. Exemption from Electricity Duty: Consumption of electricity generated by eligible producer for its captive use or upon sale to a nominated third party will be exempted from electricity duty for a period of 5 years.

iv. Sales Tax Benefits : "Eligible Producer" will be eligible for Sales Tax/ VAT deferment/ remission under the provision of schemes notified in this respect by Finance Department as modified from time to time

RPO AND REC STATUS IN MEGHALAYA

RENEWABLE PURCHASE OBLIGATION – CURRENT STATUS

Hon'ble Meghalaya State Electricity Regulatory Commission (MSERC), under its regulations "MSERC (Renewable Energy Purchase Obligation & its compliance)

Regulations, 2015" has specified Solar and Non-Solar Renewable Purchase Obligation.

As per "MSERC (Renewable Energy Purchase Obligation & its compliance) Regulations, 2015" If the Obligated Entity does not fulfill its commitment towards Renewable Purchase Obligation during any year as provided under MSERC Regulations, and also does not purchase adequate certificate for meeting the shortfalls, the Commission may direct the Obligated Entity to deposit into a separate RPO Fund such amount as the Commission may determine on the basis of the shortfall in units of RPO and at the forbearance price.

Further as per Clause 7.2 of the Regulation the defaulter shall also be liable for penalty as may be decided by the Commission under section 142 of the Act notwithstanding its liability for any other action under prevailing laws:

As per clause 7.1 of MSERC (Renewable Energy Purchase Obligation & its compliance) Regulations, 2015, State Agency (MNREDA) is required to intimate shortfall in RPO to MSERC within one month of close of that year:

Table 21: Existing Status of RPO Compliance

Particulars		FY 12	FY 13	FY 14
Compliance Requirement				
Wind	In %age	0.15%	0.20%	0.20%
	In MU	1.64	2.12	2.15
Other	In %age	0.30%	0.40%	0.40%
	In MU	3.28	4.24	4.29
Solar	In %age	0.30%	0.40%	0.40%
	In MU	3.28	4.24	4.29

However MePDCL has made negligible Purchase under wind and solar categories. There is deficit of 13.54 MU (1.94 + 3.22 + 4.17 + 4.21) to be met from solar plant from FY 10 to FY 14. Similarly, for wind the deficit is 6.76 MU (0.97+1.61+2.08+2.10). However on account of abundance of small hydro plants in the state MePDCL has surplus for small hydro which is about 267 MU over and above the requirement. According as per the regulations, the Commission is has allowed MePDCL to carry over the RPO requirement of FY 2010-11 and FY 2011-12 to be met in FY 2015-16 by providing Rs. 3.00 crores for compliance of RPO regulations 2015.

In accordance with the regulation it is also provided that if under any scheme for promoting generation from renewable source is made through generation from off-grid renewable generation in the State, the same may accounted for RPO of the distribution licensee.

RENEWABLE ENERGY CERTIFICATES

Meghalaya State Electricity Regulatory Commission has designated MNREDA as the State Agency for accreditation and recommending the renewable energy projects for registration with Central Agency and to undertake certain others functions as mention in the regulation.

The Commission through sub clause 7.1 of clause 7 of above said regulation has also provided the responsibility to MNREDA for intimating shortfall in units of RPO to Commission.

However as of now no renewable generator has been accredited for REC certificate by the Nodal agency.

PLAN FOR RENEWABLE ENERGY ADDITION UP TO FY 19

PROPOSED ADDITION OF SOLAR PARK

MePGCL is planning one solar park of capacity of 20MW for which 27 hectares of land is already identified at West Jaintia Hills & East Jaintia Hills districts.

PROPOSED ADDITION IN OFF-GRID SPV POWER PLANT

The Plan envisages a total capacity addition of 2616 Kwp up to FY 19 involving a total investment of Rs. 30.00 Crores with a breakup of Rs. 27.27 Crores Central Financial Assistance and Rs. 3.03 Crores under State Share. The investment will spread over a period of 4(four) years from FY 16 to FY 19. No amount has been earmarked for beneficiary contribution since the intended coverage will be limited to Government buildings including Hospitals, Educational Institutions and Offices in various locations of the State. The projected capacity addition will be possible if the funding is available on a 90:10 ratio between the Central Govt. and the State Govt. The total installed capacity till date is 1100 Kwp.

The basis of calculation for installation of SPV Power Plant is worked out @ of Rs.2.00 lakhs per Kwp with the breakup of Rs.1.80 lakhs as CFA and Rs.0.20 lakhs as State Share.

PROPOSED ADDITION IN SOLAR HOME LIGHTING SYSTEM

The Plan envisages a total capacity addition of 13150 Nos. of Solar Home Lighting Systems up to FY 19 involving a total investment of Rs. 16.44 Crores with a breakup of Rs. 11.82 Crores Central Financial Assistance, Rs. 1.97 Crores under State Share and Rs. 2.64 Crores as Beneficiary Contribution.

PROPOSED ADDITION IN SOLAR STREET LIGHTING SYSTEMS

It is proposed to install 1730 Solar Street Lighting Systems for the period up to FY 19. The proposed cost per system is Rs. 28,000/- with a breakup of Rs.10,000/-, Rs.9,500/- and Rs,8,500/- being the CFA, State Govt. Share and the Beneficiary Contribution respectively.

PROPOSED ADDITION IN SOLAR WATER HEATING SYSTEMS

The number of pending applications for installation of Solar Water Heating Systems in individual household is indicative of the popularity of these interventions. The Plan envisages the installation of solar water heating systems over a total collector area of 3860 sq.m during the period up to FY 19. The cost component is worked out @ Rs.27,979/-, say Rs.28,000/- per m^2 collector area (including transportation cost) with a breakup of Rs.6,600/-, Rs.10,700/- and Rs.10,700/- as CFA, State Share and Beneficiary contribution respectively.

PROPOSED ADDITION IN WIND SOLAR HYBRID SYSTEM

The total number of Solar Wind Hybrid Systems installed so far in the State is 15 Nos. with an installed capacity of 10 Kw per system. Inspite of the limited capacity, these systems have been of great help to the inmates in new Institutions where they have been installed and have offered a glimpse of the possibility of further capacity addition through these systems. With this encouragement through experience, a capacity addition of another 200 Kw over the period FY 19 is proposed under the Plan with a breakup in the cost component of 90:10 between CFA and Beneficiary contribution at a total cost of Rs. 4 Crores.

PROPOSED ADDITION IN REMOTE VILLAGE ELECTRIFICATION

Under this programme, MNREDA has been allocated a revised list of 219 villages in the State, out of which 134 villages have been covered in the earlier phase of implementation of RVE leaving behind another 85 villages to be covered under the

Plan. Accordingly, it is proposed to cover the remaining 85 villages within FY 17 only. The proposed investment is of the order of Rs. 4.52 Crores with the breakup of Rs. 3.25 Crores as CFA, Rs. 1.12 Crores as State Share and Rs. 0.14 Crores as beneficiary contribution. The physical component under the programme involving 2465 households include provision of 2-points home lighting systems and approximately 4 Nos. of street lighting systems per village on the average. The breakup of the cost components are (a home lighting systems- @ Rs. 12,500/- per system @ Rs. 8991/- CFA, Rs. 2909/- as State Share and Rs. 600/- as Beneficiary contribution and (b Solar Street Lighting system -@ Rs. 25,000/- per system @ Rs. 17980/- CFA and Rs. 7020/- as State Share. The total cost estimates also include an amount of Rs. 50,000/- per village as service charge to be met from CFA and Rs. 2.00 lakhs per annum being cost of advertisement to be met from the State Share of Funds.

PROPOSED ADDITION IN WIND MONITORING ASSESSMENT STATION

So far, 7 sites have been set up in the State and a number of them have provided a useful data about the wind potential in the different locations of the State. Some of these Masts have since been dismantled after collecting the required data and inputs and these have been compiled in the Ministry for future reference and records. In this Plan it is proposed to set up another 23 such stations spread over the period up to FY 19 with an investment of Rs. 2.76 Crores on the basis of 90:10 Ratio between the Central and State Governments. The primary locations proposed for setting up of these remaining stations are in the southern slopes of the State bordering Bangladesh.

GOI INTERVENTIONS REQUESTED

For effective implementation of Renewable Plan, the Government of Meghalaya requests following interventions from Government of India:

1. **Off- Grid SPV:** For a landlocked State like Meghalaya with hilly and unfriendly terrain, labour and transportation cost are abnormally high and it is therefore desirable that the benchmark cost per Kwp has to be fixed in a manner that will be commensurate with the costs involved. If capacity addition is sought to be linked with the requirement of meeting the Renewable Purchase Obligations of the State, there will be a crying need for a special dispensation for the States in the North East, through Central policy initiatives for attracting investments with substantial gap funding.

2. **Solar Home Lighting System:** These lighting systems with 2(two)-light points are quite popular amongst the household in the State provided they can be met available at affordable cost. For these, it will be a boon to the local population if the Central Govt. continues with its share of financial assistance in order to encourage and further popularize the use of Renewable Energy Systems.

3. **Solar Street Lighting System:** Although there is a huge demand for SSLS, the cost component of beneficiary contribution and even the State Share component is somewhat prohibitive. Given the requirement for setting up these systems in view of the growing crime rate against women and children both in urban and rural locations, it would be desirable if a dedicated fund like the Nirvbhaya Fund is introduced in order to provide a boost to the safety aspect to women and children both in urban and rural areas with substantial contribution of Central Funds and corresponding

lower injection of beneficiary contribution as well as State Plan Funds.

4. **Solar Water Heating Systems:** It is understood that the Ministry has stopped the provision of CFA under these popular sector. In view of the popularity of the systems both in individual household and Institutions like Hospitals, Hostels etc., it is requested that the CFA component may be continued at least up to FY 19.

5. GOI is requested to ensure timely release of funds as quantum of CFA under the RVE programme is yet to be received despite the fact that coverage of 134 remote villages has been completed.

6. Continuation of 90:10 Ratio of funding is a must if we are to implement Renewable Energy Programme with any degree of success.

7. Back-ended release of Central Funds holding back speedy execution.

8. Time for completion of projects for North Eastern States should be lengthened in view of the long duration of monsoons and hostile terrain.

9. Benchmark costs to be fixed appropriately keeping in mind higher cost of transportation, labour and ancillary charges.

Accordingly, the proposed capacity addition in Renewable Initiatives is summarized below:

Table 22: Proposed Capacity Addition

Sl. No.	Name of scheme	Total physical target	Year wise Physical Target				
			Existing	FY 16	FY 17	FY 18	FY 19
1.	Off-Grid Solar Photovoltaic Power Plant.	2615 Kw	1100	315 Kw	350 Kw	400 Kw	450 Kw
2.	Home lighting System	13,150	-	2500	3150	3500	4000
3.	Solar Street Lighting System.	1730 Nos.	-	530	400	400	400
4.	Solar Thermal Solar Water Heating System.	3860 Sq.m Collector area	-	330m^2	500 m^2	1430 m^2	1600 m^2
5.	Wind Solar Hybrid Power Plant.	350 Kw	-	50 Kw	50 Kw	50 Kw	50 Kw
6.	Remote Village Electrification	219 villages	134	-	34	51	-
7.	Wind Monitoring Assessment.	30 sites	7	5	6	6	6

The proposed investment in additional renewable energy projects is shown below:

Table 23: Proposed Investment in New Renewable Projects (in Rs Crores)

Sl. No.	Name of scheme	Total project cost	Share	FY 16	FY 17	FY 18	FY 19	Total
1	Off-Grid Solar Photovoltaic Power Plant.	30.30	Central	5.67	6.30	7.20	8.10	27.27
			State	0.63	0.70	0.80	0.90	3.03
			Beneficiaries					
2	Solar Home Lighting System.	16.44	Central	2.25	2.83	3.15	3.60	11.82
			State	0.38	0.47	0.53	0.60	1.97
			Beneficiaries	0.50	0.63	0.70	0.80	2.64
3	Solar Street Lighting System.	4.84	Central	0.53	0.40	0.40	0.40	1.73
			State	0.50	0.38	0.38	0.38	1.64
			Beneficiaries	0.45	0.34	0.34	0.34	1.47
4	Solar Water Heating System.	10.80	Central	0.22	0.33	0.94	1.06	2.55
			State	0.35	0.54	1.53	1.71	4.13
			Beneficiaries	0.35	0.54	1.53	1.71	4.13
5	Wind Solar Hybrid System.	4.00	Central	0.90	0.90	0.90	0.90	3.60
			State					0.00
			Beneficiaries	0.10	0.10	0.10	0.10	0.40
6	Remote village Electrification	4.52	Central		1.30	1.95		3.25
			State		0.45	0.67		1.12
			Beneficiaries		0.06	0.09		0.15
7	Wind Monitoring Assessment	2.76	Central	0.54	0.65	0.65	0.65	2.48
			State	0.06	0.07	0.07	0.07	0.28
			Beneficiaries					0.00
	Total	**73.66**		**13.43**	**19.70**	**19.22**	**21.32**	**13.43**

CHAPTER 9: ENERGY CONSERVATION AND ENERGY EFFICIENCY PROGRAM

PRESENT STATUS OF ENERGY CONSERVATION ACTIVITIES

Meghalaya State Designated Agency (MSDA) is the State Designated Agency (SDA) of Bureau of Energy Efficiency (BEE), Government of India for carrying out various energy conservation activities and programmes in the State of Meghalaya.

The various energy conservation activities performed in the state of Meghalaya:

- MOU signed between BEE & MePDCL on 27th June 2014.
- Creation of DSM Cell at MePDCL office on 28th July 2014.
- Appointment of DSM Consultants from M/S EESL at MePDCL office on 10th Sept 2014.
- Load survey & Research activity commenced on 10th October 2014 by M/s. Darashaw & Co and M/s. EESL in the state for adoption of DSM measures.

Based on the analysis of consumption pattern of different consumer categories and their contribution in aggregated demand, a DSM action plan for Meghalaya has been prepared. The key elements of this action plan include the following:

1. Promotion of energy efficient appliances: Currently around 3 to 5% of consumer is using the star rated appliances in domestic sector in refrigeration, ACs and washing machines.
2. Promotion of energy efficiency in new commercial buildings
3. Public procurement of energy efficient appliances
4. Feeder segregation based on dedicated consumers like domestic, commercial & Industrial
5. Strategic utilization of energy conservation fund and DSM fund approved by the regulator
6. Regulatory measures for promoting DSM
7. Strengthening of MePDCL DSM Cell

It is expected that implementation of these suggestions would accelerate DSM activities in the state and also provide market signals to private investors and encourage Energy Service Companies (ESCOs) to support the energy efficiency market.

MePDCL is required to prepare an actionable plan based on the above recommendations of the report by the end of FY 16 and implement same from FY 17 onwards.

PROMOTING EFFICIENT LIGHTING IN HOUSEHOLDS IN MEGHALAYA

- As per the industry statistics, a large numbers of incandescent lamps are still used in households to serve the lighting needs. Incandescent lamps are highly inefficient and 95% of electricity used by them is converted to heat. They can be replaced by LED lamps, which are 90% more energy efficient.

- Penetration of efficient lights in households is constrained by the first high cost barrier. The incandescent lamps are available at Rs. 10-15 while LED sell at Rs, 400-500 as a result the penetration of LEDs in household sector is less than 1%.

- EESL has developed and implemented a scheme called Domestic Efficient Lighting Scheme (DELP) to provide energy efficient LED lighting to grid-connected consumers in the domestic sector across Indian cities and states where high quality LED bulbs are given to households at an affordable price to encourage them to invest in energy efficiency. The large-scale replacement of incandescent lamps and CFL's with LEDs leads to savings in peak power for DISCOMs and lower power consumption of households.

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

- A 7 W LED could replace a 60 W incandescent lamp and a 14 W CFL. Through distribution of two LED's under DELP in the domestic sector of Meghalaya, considering all domestic consumers avail the scheme, the estimated overall reduction of demand shall be 13.74 MW and the annual total energy savings shall be 17.55 Million kWH. The scheme shall result into an estimated annual power procurement cost savings of INR 4.35 Crores.

A plan to cover the entire state having 2.29 lakh households has been prepared below indicating the estimated annual energy savings and estimated annual savings in power procurement cost:

S.N.	Particulars	Costs/ Savings
1	No. of Domestic Consumers (Nos.)	2,29,000
2	No. of LED bulbs to be distributed (@2Nos. to each)	4,58,000
3	Wattage of 1 ICL (60 W) and 1 CFL (14W) to be replaced (Watt)	37
4	Wattage of LEDs (Watt)	7
5	Reduction of power consumption per bulb (Watt)	30
6	**Total annual energy consumption reduction in State 3.5 Hours/day for 365 days (MU)**	**17.55**
7	Total monetary savings @ Rs. 2.48/unit (Rs.)	4.35 Cr.

CHAPTER 10: FINANCIAL VIABILITY OF DISTRIBUTION COMPANY

FINANCIAL POSITION OF DISTRIBUTION UTILITIES

The existing accumulated loss for the Meghalaya Power Distribution Corporation Limited (MePDCL) as per the audited financial accounts of FY 13 stands at Rs. 468.31 Crores, which has increased to 693.83 Crores in FY 14 (unaudited figures).

MePDCL is eligible to claim 16% of return on its equity. However, the utility is generating losses which has grown considerably over the years since its unbundling and the accumulated losses have almost outstripped the revenue earnings of the utility.

A detailed scenario analysis has been done to measure the financial performance in coming 4 years.

This analysis provided hereafter decipher that with improvement in performance to the required levels, the utility will be able to recover its accumulated losses while targeting to provide 24x7 Power to all in the state. The calculations have been based on the assumption that utilities should function without any subsidy from government.

The existing Profit and Loss statement of the MePDCL for FY 14 is given below:

Table 24: Profit and Loss Statement of the MePDCL – FY 14 (In Rs Crores)

Particulars	FY 14
Opening Accumulated Loss	-₹ 468.31
Income	
Income from Sale of Power	₹ 537.16
Other Income	-₹ 0.06
Total Income	**₹ 537.10**
Expenditure	
Transmission Charges	₹ 106.12
Power & Fuel Cost	₹ 441.62
Employee Cost	₹ 85.74
R&M cost	₹ 4.68
A&G Expenses	₹ 16.35
Total Expenses	**₹ 655**
Operating Profit	-₹ 117
PBDIT	**-₹ 117**
Interest	₹ 36
PBDT	***-₹153***
Depreciation	₹ 15
Prior Period and Exceptional Items	₹ 57
Profit Before Tax	***-₹226***
Provision for bad and doubtful debts	
PBT (Post bad and doubtful debts)	*-₹226*
Tax	
Reported Net + Profit /- Loss	**-₹ 226**
Accumulated Losses	**-₹ 693.83**

Based on the road map discussed in the previous chapters, various scenarios have been prepared to understand the sensitivity analysis of targeted parameters. However, the impact analysis on financial position has been restricted up to FY 19 as the projections of key drivers of expense and revenue items as power purchase mix and sales mix has not been projected beyond FY 19.

The following scenarios have been detailed in subsequent sections:

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

b) At targeted growth rate as per "24x7 Power for All" along with Financial Turnaround.

c) At targeted growth rate as per "24x7 Power for All" Road Map with funding of proposed investments in distribution

through state funds and financial institutions.

d) Better Loss Reduction Trajectory and subsequent dependence on Lower Tariff Hike.

e) Non-Adherence to Loss Reduction Trajectory (higher AT&C Losses) and subsequent dependence on Higher Tariff hike.

f) Scenario A plus no impact of accumulated losses plus financial turnaround.

COMMON ASSUMPTIONS

- ✓ Any change in the power purchase cost will be taken care by the Fuel and Power Purchase Cost Adjustment mechanism.
- ✓ Sale of surplus power has been considered at the average rate of Rs. 3 per unit (including wheeling charges) as there is less offtake of power by nearby states.
- ✓ Year wise cost break-up in given in Annexure 6.
- ✓ No revenue subsidy.
- ✓ Escalation towards Employees Costs has been considered at 10% based on year on year increase in CPI inflation index in FY 14.
- ✓ Escalation towards A&G expenses has been considered at 6% based on year on year increase in WPI inflation index respectively in FY 14.
- ✓ R&M Expenses has been considered at 1.4% of opening GFA.
- ✓ Phasing of capital expenditure in IPDS and DDUGJY schemes has been considered as 10% in FY 16, 60% in FY 17 and 30% in FY 18.
- ✓ Asset Additions has been considered as 50% in same year of capital expenditure. Interest is calculate on assets capitalized only and no IDC has been considered.
- ✓ Interest computations has been done as per the existing loan profile of MePDCL and addition of new loans on the prevailing market rates (i.e. at 12% p.a.)
- ✓ Category-wise average billing rate for computation of revenue for FY 15 has been taken as per the tariff order dated 12th April, 2014.
- ✓ Category-wise average billing rate for computation of revenue for FY 16 and onwards has been taken as per the latest tariff order dated 31st March 2015.
- ✓ Actual transmission charges of FY 14 have been escalated in proportion to the increase in power purchase quantum and allocation.
- ✓ For new assets, depreciation has been calculated @ 5.28% and for the existing assets the depreciation has been calculated @ 4.62% (the actual average depreciation rate of FY 14).
- ✓ As Non-tariff Income is negative in FY 14, same has been projected as Nil for future years.
- ✓ The average cost of supply has been computed after deducting non-tariff income from the expenses.
- ✓ Debt: Equity ratio is 70:30 wherever applicable for internal schemes.
- ✓ Debt: Equity ratio has been considered as 70:30 for R-APDRP (Part B) as conversion of 90% funding into grant will be applicable only when the targets laid down in the guidelines are achieved.
- ✓ For IPDS out of Rs 510 Crores envisaged in Need Assessment Document, DPR of Rs 85 Crores has been submitted by the state. Grant: Loan ratio for other centrally sponsored schemes is as per the provisions of the respective schemes for special category states (**except scenario C where no grant has been considered against IPDS and DDUGJY**).
- ✓ As MePDCL has large outstanding liability mostly towards power purchase cost, the accumulated losses are also funded through short term loan till these are eliminated.

SCENARIO A: AT TARGETED GROWTH RATE AS PER 24X7 ROAD MAP (BASE CASE)

ASSUMPTIONS

- ✓ No tariff hike
- ✓ T&D losses as per targeted trajectory.

Table 25: Assumptions for Scenario A

Particulars	Units	FY 16	FY 17	FY 18	FY 19
Energy Related Assumptions					
Energy Demand	MU	1,628	1,725	1,891	2,049
Sales	MU	1,120	1,210	1,350	1,490
Power purchase	MU	1,937	2,407	2,578	2,629
AT&C losses	%	29.79%	28.29%	26.79%	25.29%
Distribution Losses	%	28.36%	26.98%	25.61%	24.24%
Collection Efficiency	%	98.00%	98.20%	98.41%	98.62%
Power purchase cost	Rs Crores	501.16	672.96	724.96	753.20
Power purchase cost per unit sold	Rs /kWh	4.48	5.56	5.37	5.05
Power purchase cost per unit purchased	Rs /kWh	2.59	2.80	2.81	2.87
Revenue Related Parameters					
Revenue from retail sale of power	Rs crores	647	692	761	829
Tariff Increase	%	-		0.0%	0.0%
Average Billing Rate	Rs /kWh	5.78	5.72	5.63	5.56
Escalations					
Employee Costs	%	10%	10%	10%	10%
Administrative and General Costs	%	6%	6%	6%	6%

Table 26: Impact (in per unit terms) of key financial components (Scenario A)

Particulars	UoM	FY 16	FY 17	FY 18	FY 19
Total Revenue from all sources	Rs. Crores	₹ 740	₹ 897	₹ 967	₹ 1,003
Total Expense	Rs. Crores	₹ 923	₹ 1,195	₹ 1,361	₹ 1,488
PBT	Rs. Crores	-₹ 184	-₹ 298	-₹ 394	-₹ 485
ABR	Rs. per unit	₹ 5.78	₹ 5.72	₹ 5.63	₹ 5.56
ACS	Rs. per unit	₹ 8.24	₹ 9.88	₹ 10.08	₹ 9.99
Interest Cost	Rs. Crores	₹ 158.47	₹ 202.69	₹ 269.53	₹ 336.36
Tariff Increase	In %age	-	0.00%	0.00%	0.00%
O&M cost	Rs. per unit	₹ 1.14	₹ 1.17	₹ 1.18	₹ 1.19
R&M cost per unit	Rs. per unit	₹ 0.05	₹ 0.06	₹ 0.09	₹ 0.12
Employee cost per unit	Rs. per unit	₹ 0.93	₹ 0.94	₹ 0.93	₹ 0.93
Interest cost per unit	Rs. per unit	₹ 1.42	₹ 1.68	₹ 2.00	₹ 2.26
A&G cost per unit	Rs. per unit	₹ 0.16	₹ 0.16	₹ 0.15	₹ 0.15

Table 27: Financial Position of the Utility (Scenario A)

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19
Income					
Income from Retail Sale of Power	₹ 559	₹ 647	₹ 692	₹ 761	₹ 829
Income from Sale of Surplus Power	₹ 74	₹ 92	₹ 204	₹ 206	₹ 174
Other Income	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00
Total Income	**₹ 633**	**₹ 740**	**₹ 897**	**₹ 967**	**₹ 1,003**
Expenditure					
Transmission Charges	₹ 108	₹ 114	₹ 142	₹ 152	₹ 155
Power & Fuel Cost	₹ 462	₹ 501	₹ 673	₹ 725	₹ 753
Employee Cost	₹ 94	₹ 104	₹ 114	₹ 126	₹ 138
R&M cost	₹ 5	₹ 5	₹ 8	₹ 13	₹ 18
A&G Expenses	₹ 17	₹ 18	₹ 19	₹ 21	₹ 22
Total Expenses	**₹ 685**	**₹ 743**	**₹ 956**	**₹ 1,036**	**₹ 1,086**
Operating Profit	*-₹52*	*-₹3*	*-₹60*	*-₹70*	*-₹83*
PBDIT	-₹ 52	-₹ 3	-₹ 60	-₹ 70	-₹ 83
Interest	₹ 125	₹ 158	₹ 203	₹ 270	₹ 336
PBDT	*-₹177*	*-₹162*	*-₹262*	*-₹339*	*-₹419*
Depreciation	₹ 16	₹ 22	₹ 36	₹ 55	₹ 66
Exceptional Items					
Profit Before Tax	*-₹193*	*-₹184*	*-₹298*	*-₹394*	*-₹485*
Provision for bad and doubtful debts	₹ 0	₹ 0	₹ 0	₹ 0	₹ 0
PBT (Post Extra-ord Items)	*-₹193*	*-₹184*	*-₹298*	*-₹394*	*-₹485*
Tax					
Reported Net + Profit /- Loss	**-₹ 193**	**-₹ 184**	**-₹ 298**	**-₹ 394**	**-₹ 485**
Accumulated Losses	**-₹ 887**	**-₹ 1,071**	**-₹ 1,369**	**-₹ 1,763**	**-₹ 2,248**

Based on the above assumptions, it is evident that if MePDCL adheres to the PFA Roadmap targets and reduction of T&D losses, the accumulated financial losses will increase to Rs. 2,248 Crores in the FY 19 from Rs 694 Crores in FY 14.

Based on the above scenario, it is evident that timely tariff hike is also required to achieve the financial turnaround.

SCENARIO B: AT TARGETED GROWTH RATE AS PER 24X7 ROAD MAP PLUS FINANCIAL TURNAROUND

ASSUMPTIONS

- ✓ Tariff Hike of 15% every year from FY 17 to FY 19 on latest category-wise average billing rates approved by the Commission for FY 16.
- ✓ T&D losses as per targeted trajectory.

Table 28: Assumptions for Scenario B

Particulars	Units	FY 16	FY 17	FY 18	FY 19
Energy Related Assumptions					
Energy Demand	MU	1,628	1,725	1,891	2,049
Sales	MU	1,120	1,210	1,350	1,490
Power purchase	MU	1,937	2,407	2,578	2,629
AT&C losses	%	29.79%	28.29%	26.79%	25.29%
Distribution Losses	%	28.36%	26.98%	25.61%	24.24%
Collection Efficiency	%	98.00%	98.20%	98.41%	98.62%
Power purchase cost	Rs Crores	501.16	672.96	724.96	753.20
Power purchase cost per unit sold	Rs /kWh	4.48	5.56	5.37	5.05
Power purchase cost per unit purchased	Rs /kWh	2.59	2.80	2.81	2.87
Revenue Related Parameters					
Revenue from retail sale of power	Rs crores	647	796	1006	1261
Tariff Increase	%	-	15.0%	15.0%	15.0%
Average Billing Rate	Rs /kWh	5.78	6.58	7.45	8.46
Escalations					
Employee Costs	%	10%	10%	10%	10%
Administrative and General Costs	%	6%	6%	6%	6%

Table 29: Impact (in per unit terms) of key financial components (Scenario B)

Particulars	UoM	FY 16	FY 17	FY 18	FY 19
Total Revenue from all sources	Rs. Crores	₹ 740	₹ 1,000	₹ 1,212	₹ 1,435
Total Expense	Rs. Crores	₹ 923	₹ 1,195	₹ 1,345	₹ 1,434
PBT	Rs. Crores	-₹ 184	-₹ 195	-₹ 134	₹ 0
ABR	Rs. per unit	₹ 5.78	₹ 6.58	₹ 7.45	₹ 8.46
ACS	Rs. per unit	₹ 8.24	₹ 9.88	₹ 9.96	₹ 9.63
Interest Cost	Rs. Crores	₹ 158.47	₹ 202.69	₹ 254.22	₹ 282.60
Tariff Increase	In %age	-	15.00%	15.00%	15.00%
O&M cost	Rs. per unit	₹ 1.14	₹ 1.17	₹ 1.18	₹ 1.19
R&M cost per unit	Rs. per unit	₹ 0.05	₹ 0.06	₹ 0.09	₹ 0.12
Employee cost per unit	Rs. per unit	₹ 0.93	₹ 0.94	₹ 0.93	₹ 0.93
Interest cost per unit	Rs. per unit	₹ 1.42	₹ 1.68	₹ 1.88	₹ 1.90
A&G cost per unit	Rs. per unit	₹ 0.16	₹ 0.16	₹ 0.15	₹ 0.15

Table 30: Financial Position of the Utility (Scenario B)

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19
Income					
Income from Retail Sale of Power	₹ 559	₹ 647	₹ 796	₹ 1,006	₹ 1,261
Income from Sale of Surplus Power	₹ 74	₹ 92	₹ 204	₹ 206	₹ 174
Other Income	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00
Total Income	**₹ 633**	**₹ 740**	**₹ 1,000**	**₹ 1,212**	**₹ 1,435**
Expenditure					
Transmission Charges	₹ 108	₹ 114	₹ 142	₹ 152	₹ 155
Power & Fuel Cost	₹ 462	₹ 501	₹ 673	₹ 725	₹ 753
Employee Cost	₹ 94	₹ 104	₹ 114	₹ 126	₹ 138
R&M cost	₹ 5	₹ 5	₹ 8	₹ 13	₹ 18
A&G Expenses	₹ 17	₹ 18	₹ 19	₹ 21	₹ 22
Total Expenses	**₹ 685**	**₹ 743**	**₹ 956**	**₹ 1,036**	**₹ 1,086**
Operating Profit	*-₹52*	*-₹3*	*₹44*	*₹176*	*₹349*
PBDIT	-₹ 52	-₹ 3	₹ 44	₹ 176	₹ 349
Interest	₹ 125	₹ 158	₹ 203	₹ 254	₹ 283
PBDT	*-₹177*	*-₹162*	*-₹158*	*-₹78*	*₹66*
Depreciation	₹ 16	₹ 22	₹ 36	₹ 55	₹ 66
Exceptional Items					
Profit Before Tax	*-₹193*	*-₹184*	*-₹195*	*-₹134*	*₹0*
Provision for bad and doubtful debts	₹ 0	₹ 0	₹ 0	₹ 0	₹ 0
PBT (Post Extra-ord Items)	*-₹193*	*-₹184*	*-₹195*	*-₹134*	*₹0*
Tax					
Reported Net + Profit /- Loss	**-₹ 193**	**-₹ 184**	**-₹ 195**	**-₹ 134**	**₹ 0**
Accumulated Losses	**-₹ 887**	**-₹ 1,071**	**-₹ 1,265**	**-₹ 1,399**	**-₹ 1,398**

Based on the above assumptions, it is evident that if MePDCL adheres to the target electrification and reduction of losses, it has to still depend on the tariff hike to the tune of 15% every year from FY 17 to FY 19 in order to post breakeven/positive profit in FY 19.

SCENARIO C: AT TARGETED GROWTH RATE AS PER 24X7 ROAD MAP PLUS FINANCIAL TURNAROUND-PROPOSED INVESTMENTS FUNDED THROUGH LOAN ONLY

ASSUMPTIONS

- ✓ The proposed investments under IPDS and DDUGJY are funded through debt and equity in ratio 70:30.
- ✓ Higher Tariff Hike of 21% each in FY 17 to FY 19 on latest category-wise average billing rates approved by the Commission for FY 16.
- ✓ T&D losses as per targeted trajectory.

Table 31: Assumptions for Scenario C

Particulars	Units	FY 16	FY 17	FY 18	FY 19
Energy Related Assumptions					
Energy Demand	MU	1,628	1,725	1,891	2,049
Sales	MU	1,120	1,210	1,350	1,490
Power purchase	MU	1,937	2,407	2,578	2,629
AT&C losses	%	29.79%	28.29%	26.79%	25.29%
Distribution Losses	%	28.36%	26.98%	25.61%	24.24%
Collection Efficiency	%	98.00%	98.20%	98.41%	98.62%
Power purchase cost	Rs Crores	501.16	672.96	724.96	753.20
Power purchase cost per unit sold	Rs /kWh	4.48	5.56	5.37	5.05
Power purchase cost per unit purchased	Rs /kWh	2.59	2.80	2.81	2.87
Revenue Related Parameters					
Revenue from retail sale of power	Rs crores	647	838	1113	1469
Tariff Increase	%	-	21.0%	21.0%	21.0%
Average Billing Rate	Rs /kWh	5.78	6.93	8.25	9.86
Escalations					
Employee Costs	%	10%	10%	10%	10%
Administrative and General Costs	%	6%	6%	6%	6%

Table 32: Impact (in per unit terms) of key financial components (Scenario C)

Particulars	UoM	FY 16	FY 17	FY 18	FY 19
Total Revenue from all sources	Rs. Crores	₹ 740	₹ 1,042	₹ 1,320	₹ 1,643
Total Expense	Rs. Crores	₹ 928	₹ 1,240	₹ 1,475	₹ 1,632
PBT	Rs. Crores	-₹ 188	-₹ 198	-₹ 155	₹ 11
ABR	Rs. per unit	₹ 5.78	₹ 6.93	₹ 8.25	₹ 9.86
ACS	Rs. per unit	₹ 8.29	₹ 10.26	₹ 10.92	₹ 10.95
Interest Cost	Rs. Crores	₹ 161.48	₹ 230.20	₹ 328.32	₹ 392.03
Tariff Increase	In %age	-	21.00%	21.00%	21.00%
O&M cost	Rs. per unit	₹ 1.14	₹ 1.18	₹ 1.24	₹ 1.31
R&M cost per unit	Rs. per unit	₹ 0.05	₹ 0.07	₹ 0.15	₹ 0.23
Employee cost per unit	Rs. per unit	₹ 0.93	₹ 0.94	₹ 0.93	₹ 0.93
Interest cost per unit	Rs. per unit	₹ 1.44	₹ 1.90	₹ 2.43	₹ 2.63

Particulars	UoM	FY 16	FY 17	FY 18	FY 19
A&G cost per unit	Rs. per unit	₹ 0.16	₹ 0.16	₹ 0.15	₹ 0.15

Table 33: Financial Position of the Utility (Scenario C)

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19
Income					
Income from Retail Sale of Power	₹ 559	₹ 647	₹ 838	₹ 1,113	₹ 1,469
Income from Sale of Surplus Power	₹ 74	₹ 92	₹ 204	₹ 206	₹ 174
Other Income	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00
Total Income	**₹ 633**	**₹ 740**	**₹ 1,042**	**₹ 1,320**	**₹ 1,643**
Expenditure					
Transmission Charges	₹ 108	₹ 114	₹ 142	₹ 152	₹ 155
Power & Fuel Cost	₹ 462	₹ 501	₹ 673	₹ 725	₹ 753
Employee Cost	₹ 94	₹ 104	₹ 114	₹ 126	₹ 138
R&M cost	₹ 5	₹ 5	₹ 9	₹ 21	₹ 35
A&G Expenses	₹ 17	₹ 18	₹ 19	₹ 21	₹ 22
Total Expenses	**₹ 685**	**₹ 743**	**₹ 957**	**₹ 1,044**	**₹ 1,103**
Operating Profit	*-₹52*	*-₹3*	*₹85*	*₹275*	*₹539*
PBDIT	-₹ 52	-₹ 3	₹ 85	₹ 275	₹ 539
Interest	₹ 125	₹ 161	₹ 230	₹ 328	₹ 392
PBDT	*-₹177*	*-₹165*	*-₹145*	*-₹53*	*₹147*
Depreciation	₹ 16	₹ 24	₹ 53	₹ 102	₹ 137
Exceptional Items					
Profit Before Tax	*-₹193*	*-₹188*	*-₹198*	*-₹155*	*₹11*
Provision for bad and doubtful debts	₹ 0	₹ 0	₹ 0	₹ 0	₹ 0
PBT (Post Extra-ord Items)	*-₹193*	*-₹188*	*-₹198*	*-₹155*	*₹11*
Tax					
Reported Net + Profit /- Loss	**-₹ 193**	**-₹ 188**	**-₹ 198**	**-₹ 155**	**₹ 11**
Accumulated Losses	**-₹ 887**	**-₹ 1,075**	**-₹ 1,274**	**-₹ 1,429**	**-₹ 1,418**

Based on the above assumptions, it is evident that if MePDCL adheres to the target electrification and reduction of losses, and funds the entire capital expenditure proposed under IPDS and DDUGJY through combination of State Government equity, loans from FI/Multilateral/Bilateral agencies etc., it has to still depend on the higher tariff hike to the tune of 21% every year from FY 17 to FY 19 in order to post positive profit in FY 19.

SCENARIO D: BETTER PERFORMANCE PARAMETERS (LOSS REDUCTION TRAJECTORY) AND SUBSEQUENT DEPENDENCE ON LOWER TARIFF HIKE

ASSUMPTIONS

- ✓ **T&D losses lower than the targeted trajectory.**
- ✓ Tariff Hike of 10.2% each year from FY 17 to FY 19 on latest category-wise average billing rates approved by the Commission for FY 16.

Table 34: Assumptions for Scenario D

Particulars	Units	FY 16	FY 17	FY 18	FY 19
Energy Related Assumptions					
Energy Demand	MU	1,605	1,690	1,840	1,983
Sales	MU	1,120	1,210	1,350	1,490
Power purchase	MU	1,937	2,407	2,578	2,629
AT&C losses	%	28.79%	26.79%	24.79%	22.79%
Distribution Losses	%	27.34%	25.45%	23.58%	21.71%
Collection Efficiency	%	98.00%	98.20%	98.41%	98.62%
Power purchase cost	Rs Crores	501.16	672.96	724.96	753.20
Power purchase cost per unit sold	Rs /kWh	4.48	5.56	5.37	5.05
Power purchase cost per unit purchased	Rs /kWh	2.59	2.80	2.81	2.87
Revenue Related Parameters					
Revenue from retail sale of power	Rs crores	647	763	924	1109
Tariff Increase	%	-	10.2%	10.2%	10.2%
Average Billing Rate	Rs /kWh	5.78	6.31	6.84	7.44
Escalations					
Employee Costs	%	10%	10%	10%	10%
Administrative and General Costs	%	6%	6%	6%	6%

Table 35: Impact (in per unit terms) of key financial components (Scenario D)

Particulars	UoM	FY 16	FY 17	FY 18	FY 19
Total Revenue from all sources	Rs. Crores	₹ 796	₹ 1,085	₹ 1,255	₹ 1,400
Total Expense	Rs. Crores	₹ 918	₹ 1,180	₹ 1,316	₹ 1,394
PBT	Rs. Crores	-₹ 122	-₹ 95	-₹ 61	₹ 6
ABR	Rs. per unit	₹ 5.78	₹ 6.31	₹ 6.84	₹ 7.44
ACS	Rs. per unit	₹ 8.20	₹ 9.76	₹ 9.75	₹ 9.36
Interest Cost	Rs. Crores	₹ 153.01	₹ 188.09	₹ 224.94	₹ 242.60
Tariff Increase	In %age	-	10.20%	10.20%	10.20%
O&M cost	Rs. per unit	₹ 1.14	₹ 1.17	₹ 1.18	₹ 1.19
R&M cost per unit	Rs. per unit	₹ 0.05	₹ 0.06	₹ 0.09	₹ 0.12
Employee cost per unit	Rs. per unit	₹ 0.93	₹ 0.94	₹ 0.93	₹ 0.93
Interest cost per unit	Rs. per unit	₹ 1.37	₹ 1.56	₹ 1.67	₹ 1.63
A&G cost per unit	Rs. per unit	₹ 0.16	₹ 0.16	₹ 0.15	₹ 0.15

Table 36: Financial Position of the Utility (Scenario D)

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19
Income					
Income from Retail Sale of Power	₹ 559	₹ 647	₹ 763	₹ 924	₹ 1,109
Income from Sale of Surplus Power	₹ 111	₹ 149	₹ 322	₹ 332	₹ 291
Other Income	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00
Total Income	**₹ 670**	**₹ 796**	**₹ 1,085**	**₹ 1,255**	**₹ 1,400**
Expenditure					
Transmission Charges	₹ 108	₹ 114	₹ 142	₹ 152	₹ 155
Power & Fuel Cost	₹ 462	₹ 501	₹ 673	₹ 725	₹ 753
Employee Cost	₹ 94	₹ 104	₹ 114	₹ 126	₹ 138
R&M cost	₹ 5	₹ 5	₹ 8	₹ 13	₹ 18
A&G Expenses	₹ 17	₹ 18	₹ 19	₹ 21	₹ 22
Total Expenses	**₹ 685**	**₹ 743**	**₹ 956**	**₹ 1,036**	**₹ 1,086**
Operating Profit	*-₹15*	*₹53*	*₹129*	*₹219*	*₹314*
PBDIT	-₹ 15	₹ 53	₹ 129	₹ 219	₹ 314
Interest	₹ 125	₹ 153	₹ 188	₹ 225	₹ 243
PBDT	*-₹140*	*-₹100*	*-₹59*	*-₹6*	*₹72*
Depreciation	₹ 16	₹ 22	₹ 36	₹ 55	₹ 66
Exceptional Items					
Profit Before Tax	*-₹156*	*-₹122*	*-₹95*	*-₹61*	*₹6*
Provision for bad and doubtful debts	₹ 0	₹ 0	₹ 0	₹ 0	₹ 0
PBT (Post Extra-ord Items)	*-₹156*	*-₹122*	*-₹95*	*-₹61*	*₹6*
Tax					
Reported Net + Profit /- Loss	**-₹ 156**	**-₹ 122**	**-₹ 95**	**-₹ 61**	**₹ 6**
Accumulated Losses	**-₹ 850**	**-₹ 972**	**-₹ 1,067**	**-₹ 1,127**	**-₹ 1,122**

Based on the above assumptions, it is evident that if MePDCL adheres to the target electrification and manages higher reduction of losses (additional 2%), and if in addition MePDCL also manages to sell surplus power @ Rs 4.5 per unit instead of Rs 3.00 per unit, MePDCL has to depend on lower tariff hike of 10.2% each year from FY 17 to FY 19 in order to post positive profit in FY 19.

Thus, it can be inferred from above that improvement of efficiency and better power purchase/sale planning will reduce the dependence on tariff hike (in above case by almost 5% from Scenario B).

SCENARIO E: NON ADHERANCE TO LOSS REDUCTION TRAJECTORY (HIGHER LOSS REDUCTION TRAJECTORY) AND SUBSEQUENT DEPENDENCE ON HIGHER TARIFF HIKE

ASSUMPTIONS

- ✓ **T&D losses higher than the targeted trajectory.**
- ✓ Higher Tariff Hike of 16% each year from FY 17 to FY 19 on latest category-wise average billing rates approved by the Commission for FY 16.

Table 37: Assumptions for Scenario E

Particulars	Units	FY 16	FY 17	FY 18	FY 19
Energy Related Assumptions					
Energy Demand	MU	1,676	1,775	1,944	2,105
Sales	MU	1,120	1,210	1,350	1,490
Power purchase	MU	1,937	2,407	2,578	2,629
AT&C losses	%	31.79%	30.29%	28.79%	27.29%
Distribution Losses	%	30.40%	29.01%	27.64%	26.27%
Collection Efficiency	%	98.00%	98.20%	98.41%	98.62%
Power purchase cost	Rs Crores	501.16	672.96	724.96	753.20
Power purchase cost per unit sold	Rs /kWh	4.48	5.56	5.37	5.05
Power purchase cost per unit purchased	Rs /kWh	2.59	2.80	2.81	2.87
Revenue Related Parameters					
Revenue from retail sale of power	Rs crores	647	803	1023	1294
Tariff Increase	%	-	16.0%	16.0%	16.0%
Average Billing Rate	Rs /kWh	5.78	6.64	7.58	8.68
Escalations					
Employee Costs	%	10%	10%	10%	10%
Administrative and General Costs	%	6%	6%	6%	6%

Table 38: Impact (in per unit terms) of key financial components (Scenario E)

Particulars	UoM	FY 16	FY 17	FY 18	FY 19
Total Revenue from all sources	Rs. Crores	₹ 725	₹ 993	₹ 1,213	₹ 1,451
Total Expense	Rs. Crores	₹ 923	₹ 1,197	₹ 1,350	₹ 1,444
PBT	Rs. Crores	-₹ 198	-₹ 205	-₹ 136	₹ 7
ABR	Rs. per unit	₹ 5.78	₹ 6.64	₹ 7.58	₹ 8.68
ACS	Rs. per unit	₹ 8.24	₹ 9.90	₹ 10.00	₹ 9.69
Interest Cost	Rs. Crores	₹ 158.47	₹ 204.81	₹ 258.31	₹ 290.56
Tariff Increase	In %age	-	16.00%	16.00%	16.00%
O&M cost	Rs. per unit	₹ 1.14	₹ 1.17	₹ 1.18	₹ 1.19
R&M cost per unit	Rs. per unit	₹ 0.05	₹ 0.06	₹ 0.09	₹ 0.12
Employee cost per unit	Rs. per unit	₹ 0.93	₹ 0.94	₹ 0.93	₹ 0.93
Interest cost per unit	Rs. per unit	₹ 1.42	₹ 1.69	₹ 1.91	₹ 1.95
A&G cost per unit	Rs. per unit	₹ 0.16	₹ 0.16	₹ 0.15	₹ 0.15

Table 39: Financial Position of the Utility (Scenario E)

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19
Income					
Income from Retail Sale of Power	₹ 559	₹ 647	₹ 803	₹ 1,023	₹ 1,294
Income from Sale of Surplus Power	₹ 74	₹ 78	₹ 190	₹ 190	₹ 157
Other Income	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00
Total Income	**₹ 633**	**₹ 725**	**₹ 993**	**₹ 1,213**	**₹ 1,451**
Expenditure					
Transmission Charges	₹ 108	₹ 114	₹ 142	₹ 152	₹ 155
Power & Fuel Cost	₹ 462	₹ 501	₹ 673	₹ 725	₹ 753
Employee Cost	₹ 94	₹ 104	₹ 114	₹ 126	₹ 138
R&M cost	₹ 5	₹ 5	₹ 8	₹ 13	₹ 18
A&G Expenses	₹ 17	₹ 18	₹ 19	₹ 21	₹ 22
Total Expenses	**₹ 685**	**₹ 743**	**₹ 956**	**₹ 1,036**	**₹ 1,086**
Operating Profit	*-₹52*	*-₹17*	*₹36*	*₹177*	*₹365*
PBDIT	-₹ 52	-₹ 17	₹ 36	₹ 177	₹ 365
Interest	₹ 125	₹ 158	₹ 205	₹ 258	₹ 291
PBDT	*-₹177*	*-₹176*	*-₹168*	*-₹81*	*₹74*
Depreciation	₹ 16	₹ 22	₹ 36	₹ 55	₹ 67
Exceptional Items					
Profit Before Tax	*-₹193*	*-₹198*	*-₹205*	*-₹136*	*₹7*
Provision for bad and doubtful debts	₹ 0	₹ 0	₹ 0	₹ 0	₹ 0
PBT (Post Extra-ord Items)	*-₹193*	*-₹198*	*-₹205*	*-₹136*	*₹7*
Tax					
Reported Net + Profit /- Loss	**-₹ 193**	**-₹ 198**	**-₹ 205**	**-₹ 136**	**₹ 7**
Accumulated Losses	**-₹ 887**	**-₹ 1,085**	**-₹ 1,289**	**-₹ 1,426**	**-₹ 1,419**

Based on the above assumptions, it is evident that if MePDCL adheres to the target electrification and but fails to adhere to loss reduction trajectory (2% increase in T&D Losses), the MePDCL has to depend on higher tariff hike of 16% each year from FY 17 to FY 19 (against 15% each year in Scenario B) in order to post positive profit in FY 19.

SCENARIO F: SCENARIO A PLUS NO IMPACT OF ACCUMULATED LOSSES PLUS FINANCIAL TURNAROUND

ASSUMPTIONS

- ✓ Tariff Hike of 10% every year from FY 17 to FY 19 on latest category-wise average billing rates approved by the Commission for FY 16
- ✓ T&D losses as per targeted trajectory.
- ✓ Accumulated Losses not carried forward.

Table 40: Assumptions for Scenario F

Particulars	Units	FY 16	FY 17	FY 18	FY 19
Energy Related Assumptions					
Energy Demand	MU	1,628	1,725	1,891	2,049
Sales	MU	1,120	1,210	1,350	1,490
Power purchase	MU	1,937	2,407	2,578	2,629
AT&C losses	%	29.79%	28.29%	26.79%	25.29%
Distribution Losses	%	28.36%	26.98%	25.61%	24.24%
Collection Efficiency	%	98.00%	98.20%	98.41%	98.62%
Power purchase cost	Rs Crores	501.16	672.96	724.96	753.20
Power purchase cost per unit sold	Rs /kWh	4.48	5.56	5.37	5.05
Power purchase cost per unit purchased	Rs /kWh	2.59	2.80	2.81	2.87
Revenue Related Parameters					
Revenue from retail sale of power	Rs crores	647	761	920	1103
Tariff Increase	%	-	10.0%	10.0%	10.0%
Average Billing Rate	Rs /kWh	5.78	6.30	6.82	7.40
Escalations					
Employee Costs	%	10%	10%	10%	10%
Administrative and General Costs	%	6%	6%	6%	6%

Table 41: Impact (in per unit terms) of key financial components (Scenario F)

Particulars	UoM	FY 16	FY 17	FY 18	FY 19
Total Revenue from all sources	Rs. Crores	₹ 740	₹ 966	₹ 1,126	₹ 1,277
Total Expense	Rs. Crores	₹ 806	₹ 1,060	₹ 1,196	₹ 1,275
PBT	Rs. Crores	-₹ 66	-₹ 94	-₹ 70	₹ 2
ABR	Rs. per unit	₹ 5.78	₹ 6.30	₹ 6.82	₹ 7.40
ACS	Rs. per unit	₹ 7.20	₹ 8.77	₹ 8.86	₹ 8.56
Interest Cost	Rs. Crores	₹ 41.04	₹ 67.94	₹ 104.69	₹ 123.64
Tariff Increase	In %age	-	10.00%	10.00%	10.00%
O&M cost	Rs. per unit	₹ 1.14	₹ 1.17	₹ 1.18	₹ 1.19
R&M cost per unit	Rs. per unit	₹ 0.05	₹ 0.06	₹ 0.09	₹ 0.12
Employee cost per unit	Rs. per unit	₹ 0.93	₹ 0.94	₹ 0.93	₹ 0.93
Interest cost per unit	Rs. per unit	₹ 0.37	₹ 0.56	₹ 0.78	₹ 0.83

Particulars	UoM	FY 16	FY 17	FY 18	FY 19
A&G cost per unit	Rs. per unit	₹ 0.16	₹ 0.16	₹ 0.15	₹ 0.15

Table 42: Financial Position of the Utility (Scenario F)

Particulars	FY 15	FY 16	FY 17	FY 18	FY 19
Income					
Income from Retail Sale of Power	₹ 559	₹ 647	₹ 761	₹ 920	₹ 1,103
Income from Sale of Surplus Power	₹ 74	₹ 92	₹ 204	₹ 206	₹ 174
Other Income	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00
Total Income	**₹ 633**	**₹ 740**	**₹ 966**	**₹ 1,126**	**₹ 1,277**
Expenditure					
Transmission Charges	₹ 108	₹ 114	₹ 142	₹ 152	₹ 155
Power & Fuel Cost	₹ 462	₹ 501	₹ 673	₹ 725	₹ 753
Employee Cost	₹ 94	₹ 104	₹ 114	₹ 126	₹ 138
R&M cost	₹ 5	₹ 5	₹ 8	₹ 13	₹ 18
A&G Expenses	₹ 17	₹ 18	₹ 19	₹ 21	₹ 22
Total Expenses	**₹ 685**	**₹ 743**	**₹ 956**	**₹ 1,036**	**₹ 1,086**
Operating Profit	*-₹52*	*-₹3*	*₹10*	*₹90*	*₹191*
PBDIT	-₹ 52	-₹ 3	₹ 10	₹ 90	₹ 191
Interest	₹ 23	₹ 41	₹ 68	₹ 105	₹ 124
PBDT	*-₹75*	*-₹44*	*-₹58*	*-₹14*	*₹68*
Depreciation	₹ 16	₹ 22	₹ 36	₹ 55	₹ 66
Exceptional Items					
Profit Before Tax	*-₹91*	*-₹66*	*-₹94*	*-₹70*	*₹2*
Provision for bad and doubtful debts	₹ 0	₹ 0	₹ 0	₹ 0	₹ 0
PBT (Post Extra-ord Items)	*-₹91*	*-₹66*	*-₹94*	*-₹70*	*₹2*
Tax					
Reported Net + Profit /- Loss	**-₹ 91**	**-₹ 66**	**-₹ 94**	**-₹ 70**	**₹ 2**
Accumulated Losses	**-₹ 91**	**-₹ 157**	**-₹ 251**	**-₹ 321**	**-₹ 319**

Based on the above assumptions, it is evident that if MePDCL adheres to the target electrification and reduction of losses and accumulated losses are not carried forward, it has to still depend on the tariff hike to the tune of 10% every year from FY 17 to FY 19 in order to post positive profit in FY 19.

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 UPCL for looking at activities of overall communication strategy.

The financial situation in Meghalaya 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 should 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 Meghalaya will also be required:

Table 43: Proposed Communication Responsibilities

Communication Objective	Responsibility	Frequency
"Power for All" - Roll Out Plan	Secretary, Energy	Quarterly
Status update on Deliverables	Secretary, Energy	Quarterly
Generation Projects *Physical Progress, Achievements and Other Relates Issues*	Director Generation, MePGCL	Quarterly
Inter-State Transmission Projects *Physical Progress, Achievements and Other Relates Issues*	Director (Projects), PGCIL	Monthly
Intra-State Transmission Projects *Physical Progress, Achievements and Other Relates Issues*	Director Transmission, MePTCL	Monthly
Distribution *Progress, Achievements, Losses, Consumer Initiatives etc.*	Director Distribution, MePDCL	Monthly
Renewable Power	Director MREDA	Quarterly

INFORMATION TECHNOLOGY

The need to adopt IT in every sphere of utility operation is self-evident. 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.

- ✓ Power procurement planning and optimization tools will be implemented to reduce the power procurement costs and improve supply reliability. This will 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.

- ✓ Implementation of Enterprise Resource Planning Systems (ERP) which 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.
- ✓ In order to curb the malpractices being done at the level of meter readers while entering the meter reading of the consumers, "**Mobile Based Photo Meter Reading & Billing System**" may be adopted.
- ✓ Centralized Information & Monitoring System for operational, enforcement & litigation, vigilance activities and analysis have to be operationalized.
- ✓ Power management would require 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 very useful for improving reliability and reduction of network downtime.
- ✓ Requirement of Regional Distribution Control Centres (RDCC) within the State will be identified in view of upcoming projected load. 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.
- ✓ 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 Electricity Act 2003 will be monitored. The utilities shall use IT tools to gather the information with regard to service standards with minimal manual.

The above measures, need to be implemented on priority basis by UPCL and also 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 undertaken in this scheme.

- **Government of India (GOI) Level Committee:** It is proposed that this committee will review the overall progress of the scheme on a quarterly basis and provide necessary support to ensure a coordinated response from the Central Government - where necessary. The committee may be constituted with the following members – PFC, REC, CEA, SECI, EESL, BEE, Ministry of Power, MoEF and MNRE.
- **State Government Level Committee:** It is proposed that a State level

committee headed by the Secretary (Power) will be formed to review the progress of the scheme on a quarterly basis. This committee will monitor the progress of the works undertaken as part of the scheme and issue directions to enable faster execution.

- **Department Level Committee:** It is proposed that a Department level committee headed by the Nodal Officer will be formed which shall undertake steps required to ensure the projects are progressing as per the action plan. This committee will undertake progress reviews on a monthly basis.

- **District Level Committee** – It is proposed to constitute a district level committee headed by the S.E. to take action that is necessary to ensure the projects are completed in a timely manner and address any issues pertaining to land or other relevant approvals.

- **Project Monitoring Unit (PMU)** – A project monitoring unit shall be set up for monitoring the progress of the works being undertaken under this scheme. The PMU will operate under the Secretary, Energy and shall be operated by an external independent agency.

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

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

CAPACITY BUILDING

With the increase of IT applications in the Transmission & Distribution system and to meet the expectations of 24x7 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 and keeping abreast with latest technological developments. 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 that for transforming the distribution utility into a customer friendly one, change of mind-set of the employees would be required. It is critical that Change Management initiatives are rolled out and institutionalized for achieving better results.

In view of the importance of training on new technologies, there is a requirement for development and implementation of a well-structured Human Resource Training Programme to help realize the dream of 24x7 power supply system in the state in its true sense.

There is already a provision for Demand Side Management (DMS) training under various programmes of Bureau of energy Efficiency (BEE) and the same should be implemented to achieve the goal of 24 x 7 power. The training for the class C & D employees is also being provided under RAPDRP Part C scheme.

A state level officers training institute may be required to be opened in the state to fulfil the ongoing training requirement for employees of Meghalaya Power Utilities.

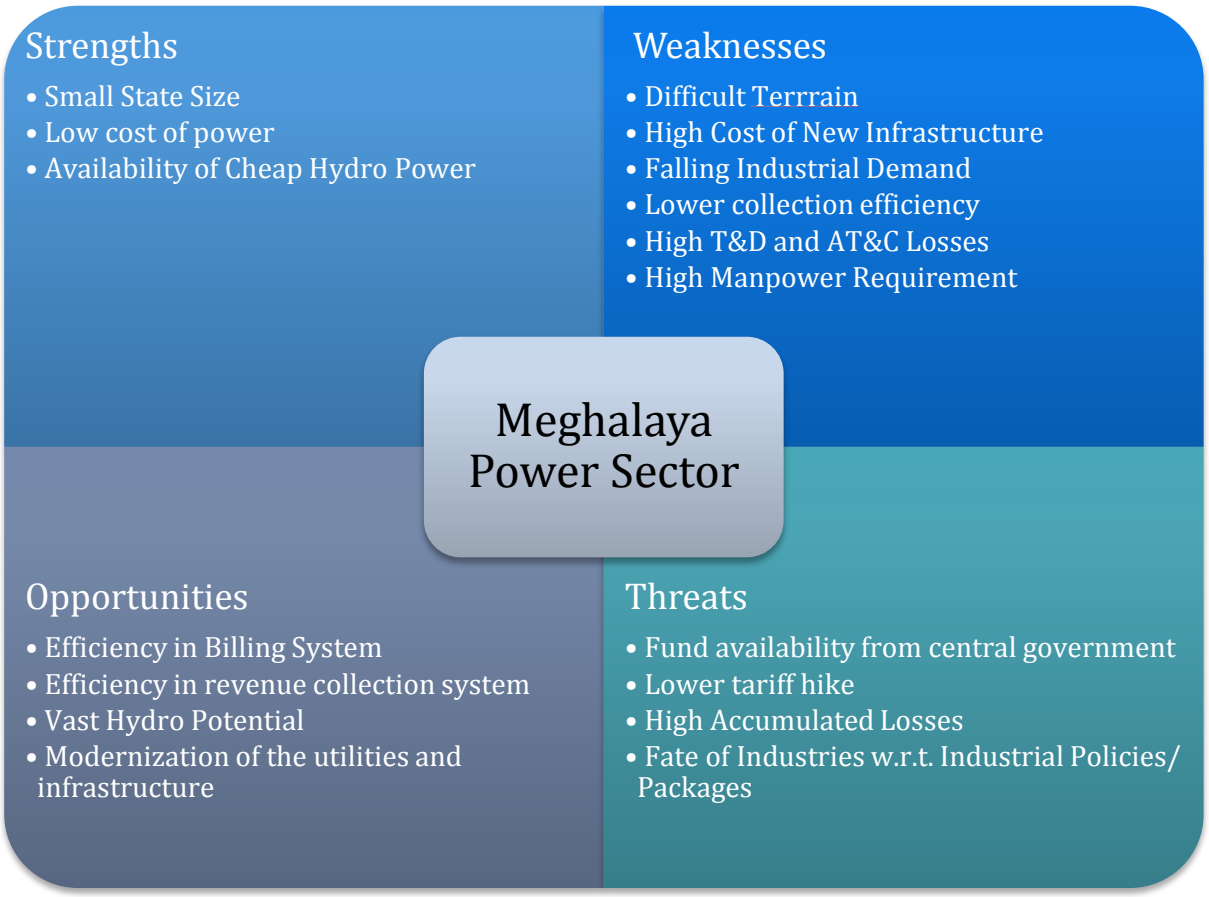
This also helps in training of subordinate technical staff. Following training programmes are proposed to be implemented for the utility:

- ✓ Two Weeks trainings for technical staff including officers & engineers once in every two years.
- ✓ One week training for non-technical officers every two years.
- ✓ One week training for subordinate technical staff at each district headquarters every year.

CHAPTER 12: YEAR WISE ROLL OUT PLAN

SWOT ANALYSIS

In the above sections we have discussed in detail the existing status and its future needs. We have also provided some actionable targets which will help Meghalaya in achieving the set goal. Before structuring the above targets, SWOT analysis of existing power sector in Meghalaya has been discussed. The exercise has been done to bring out some of the key risk indicators which affect the overall market in Meghalaya along with advantages present.



From the above analysis it is quite evident that most of the threats are external factors which would need continuous efforts from Meghalaya to mitigate them as soon as possible. Further, from the weaknesses tabulated it is seen that, with some strong and bold measures Meghalaya will be able to attain the target.

Based on the above observations, a road map for Meghalaya has been developed to mitigate the above weaknesses and threats.

ROAD MAP FOR POWER FOR ALL

Table 44: Roll Out Plan

Sl. No.	Category	Base year scenario (FY 15)	Rollout Plan					Total expected capacity FY 19
			FY 16	FY 17	FY 18	FY 19	Total	
GENERATION								
A	**Availability (MW):**							
	State Sector							
1	Hydro	282.00		40.00			**40.00**	322.00
2	Renewable	**32.70**	**0.00**	**1.50**	**22.50**	**23.00**	**47.00**	**79.70**
	Small Hydro	32.70	0.00	1.50	22.50	3.00	**27.00**	59.70
	Solar	0.00	0.00	0.00	0.00	20.00	**20.00**	20.00
	Central Sector							
4	Thermal-Gas	105.00	1.50	0.00	0.00	0.00	**1.50**	106.50
5	Thermal-Coal	0.00	18.00	18.00	18.00	0.00	**54.00**	54.00
6	Hydro	73.30	0.00	29.00	0.00	0.00	**29.00**	102.30
Total Availability (MW)		**493.00**	**19.50**	**88.50**	**40.50**	**23.00**	**171.50**	**664.50**
B	**Peak Demand (MW):**							
1	Peak Demand (MW)	**370**	**360**	**379**	**412**	**444**		**444**
2	Per Capita Consumption	**499**	**485**	**502**	**536**	**567**		**567**
TRANSMISSION								
C	**Transmission Lines (CKM):**							
1	**Inter State**	**557**	**97**	**0**	**16**	**0**	**113**	669
	400 kV	4	0	0	0	0	**0**	4
	220 kV	227	0	0	0	0	**0**	227
	132 kV	325	97	0	16	0	**113**	438
2	**Intra State**	**808**	**67**	**0**	**7**	**506**	**580**	1388
	220 kV	0	0	0	0	244	**244**	244
	132 kV	808	67	0	7	262	**336**	1144
Total Transmission Line		**1364**	**164**	**0**	**23**	**506**	**693**	**2057**
D	**Transformation Capacity (MVA):**							
1	**Inter State**	**1150**	**0**	**0**	**0**	**0**	**0**	**1150**
	400/220 kV	630	0	0	0	0	**0**	630
	220/132 kV	520	0	0	0	0	**0**	520
2	**Intra State**	**465**	**185**	**60**	**40**	**980**	**1265**	**1730**
	220/132 kV	0	0	0	0	640	**640**	640
	132/33 kV	465	185	60	40	340	**625**	1090
Total Transformation Capacity		**1615**	**185**	**60**	**40**	**980**	**1265**	**2880**
DISTRIBUTION								
E	**Connecting the Unconnected**							
1	Village Electrification (Grid)			358	537		**895**	895
2	Village Electrification (Off Grid)	134	-	41	61		**102**	236
3	Target Electrification – Rural	-	9,365	46,822	93,645	37,458	**1,87,290**	1,87,290
4	Target Electrification – Urban		0	8,267	12,401	0	**20,668**	20,668
F	**Efficiency Improvement**							
1	T&D Losses	32.62%	28.36%	26.98%	25.61%	25.24%		25.24%
2	AT&C Losses	34.94%	29.79%	28.29%	26.79%	25.29%		25.29%

Sl. No.	Category	Base year scenario (FY 15)	Rollout Plan					Total expected capacity FY 19
			FY 16	FY 17	FY 18	FY 19	Total	
G	**Capacity Addition/Augmentation**							
1	33 kV Substation (MVA Capacity)	381.91	42.8	119.6	70	310.4	**542.8**	924.71
2	33 kV Lines (CKT Km.)	1932.78	46.25	227.29	140.6	871	**1285.14**	3217.92
3	11 kV Lines (CKT Km.)	12385.24	98.27	497.47	81.5	3459.9	**4137.14**	16522.38
4	LT Lines (CKT Km.)	17781.39	35.72	30.22	81.3	4560.8	**4708.04**	22489.43
5	DTs (MVA Capacity)	598.59	28.3	12.86	62.87	70.37	**174.4**	772.99
RENEWABLE INITIATIVES								
1	Off-Grid SPV (kWp)	1100	315	350	400	450	**1515**	2615
2	Home Lighting System		2500	3150	3500	4000	**13150**	13150
3	Solar Street Lighting System		530	400	400	400	**1730**	1730
4	Solar Thermal Solar Water Heating System. Sq. m Collector Area		330	500	1430	1600	**3860**	3860
5	Wind Solar Hybrid Power Plant (kW)		50	50	50	50	**200**	200
6	Wind Monitoring Assessment	7	5	6	6	6	**23**	30

The district-wise / division-wise actionable roll-out plan has been detailed in Annexure – 7.

CHAPTER 13: FUND REQUIREMENT

The fund requirement for various schemes (ongoing and proposed) for Generation, Transmission, Distribution and Renewable energy plan as discussed in previous chapters is tabulated below:

Table 45: Fund Requirement

Sl. No.	Category	Fund Requirement (in Rs Crores)				
		FY 16	FY 17	FY 18	FY 19	Total
A	**Generation**					
1	Own Generation (to be Commissioned up to FY 19)	271	16	10	0	**297**
2	R&M of Existing Stations	7	53	13	4	**77**
	Total Fund Requirement (Generation)	**278**	**69**	**23**	**4**	**374**
B	**Transmission**					
1	Inter State - Transmission Lines	26	0	37	0	**63**
2	Intra State - Transmission Lines	61	0	15	56	**132**
3	Inter State - Substations	0	0	0	0	**0**
4	Intra State - Substations	75	69	25	23	**192**
5	NERPSIP	777				**777**
	Total Fund Requirement (Transmission)	**162**	**69**	**77**	**856**	**1163**
C	**Distribution**					
1	IPDS	51	306	153	0	**511**
2	DDUGJY	159	952	476	0	**1587**
3	NERSIP	71	53	36	18	**178**
4	Other Schemes	184	93	0	0	**278**
	Total Fund Requirement (Distribution)	**465**	**1405**	**665**	**18**	**2553**

The request of Government of Meghalaya for funds under IPDS and DDUGJY would be considered by Government of India as per its policies/ frameworks or otherwise Government of Meghalaya would make arrangements for funding from FIs/Banks/Multilateral funding agencies.

ANNEXURES

ANNEXURE – 1

Table 46: Area Details as per 2011 Census (in Sq. Km.)[6]

S. No.	District Name	Total	Rural		Urban	
		(in Sq. Km)	In Sq. Km	In %age	In Sq. Km	In %age
1	West Garo Hills	3,677	3,659	99.50%	18.32	0.50%
2	East Garo Hills	2,603	2,578	99.06%	24.54	0.94%
3	South Garo Hills	1,887	1,878	99.53%	8.8	0.47%
4	West Khasi Hills	5,247	5,150	98.16%	96.63	1.84%
5	Ribhoi	2,448	2,390	97.63%	57.98	2.37%
6	East Khasi Hills	2,748	2,679	97.50%	68.62	2.50%
7	Jaintia Hills	3,819	3,811	99.79%	8	0.21%
Overall		**22,429**	**22,146**	**98.74%**	**283**	**1.26%**

Table 47: Population Details as per 2011 Census (In Nos.) [7]

S. No.	District Name	Total	Rural		Urban	
		(in No.s)	In No.s	In %age	In No.s	In %age
1	West Garo Hills	6,43,291	5,68,433	88.36%	74858	11.64%
2	East Garo Hills	3,17,917	2,73,725	86.10%	44192	13.90%
3	South Garo Hills	1,42,334	1,29,203	90.77%	13131	9.23%
4	West Khasi Hills	3,83,461	3,40,356	88.76%	43105	11.24%
5	Ribhoi	2,58,840	2,33,587	90.24%	25253	9.76%
6	East Khasi Hills	8,25,922	4,59,441	55.63%	366481	44.37%
7	Jaintia Hills	3,95,124	3,66,694	92.80%	28430	7.20%
Overall		**29,66,889**	**23,71,439**	**79.93%**	**5,95,450**	**20.07%**

[6] *As per the information available in http://censusindia.gov.in/*

[7] *As per the information available in http://censusindia.gov.in/*

ANNEXURE – 2

Table 48: District wise Households and their Electrification Status (in %age) [8]

S. No.	District Name	Households		Electrification Status - Rural		Electrification Status - Urban	
		Rural	Urban	Electrified	Un-Electrified	Electrified	Un-Electrified
1	West Garo Hills	88.64%	11.36%	36.03%	63.97%	89.67%	10.33%
2	East Garo Hills	86.50%	13.50%	35.47%	64.53%	89.79%	10.21%
3	South Garo Hills	90.20%	9.80%	41.29%	58.71%	81.11%	18.89%
4	West Khasi Hills	88.82%	11.18%	47.38%	52.62%	85.74%	14.26%
5	Ribhoi	91.82%	8.18%	65.66%	34.34%	84.34%	15.66%
6	East Khasi Hills	52.66%	47.34%	72.39%	27.61%	98.02%	1.98%
7	Jaintia Hills	92.04%	7.96%	61.36%	38.64%	97.95%	2.05%
Overall		**78.43%**	**21.57%**	**51.57%**	**48.43%**	**94.93%**	**5.07%**

[8] *As per the information available in http://censusindia.gov.in/*

ANNEXURE – 3

Table 49: Planned ISTS Substations

None.

Table 50: Planned Intra-state Substations

Sl. No.	Name of the Project	Project Cost (in Crores)	Voltage level (KV)	No. of ICTs x MVA Capacity	Total MVA	Target Date
220/132kV Transformers						
1	220/132 kV S/s at Mawngap	WB	220/132	2x 160	320	Mar-19
2	220/132 kV S/s at New Shillong	WB	220/132	2x 160	320	Mar-19
Total: 220/132kV Transformers					**640**	
132/33kV Transformers						
1	132 kV Sub-station at New Shillong		132/33	2 x 50	100	Mar-19
2	132 kV Sub-station at New Mynkre		132/33	2 x 50	100	Mar-19
3	132 kV Sub-station at New Phulbari		132/33	2 x 50	100	Mar-19
4	132 kV substation at Ampati	14.04	132/33	2 x 25	50	Oct-15
5	132 kV substation at Praharinagar	18.91	132/33	1 x 20	20	Sep-16
6	132 KV substation at Lad Nongkrem	24.31	132/33	2 x 20	40	Mar-16
7	132 KV substation at Maustem	22.17	132/33	2 x 20	40	Oct-15
8	132 KV substation at Mendipather	9.56	132/33	2 x 20	40	Oct-15
9	Increasing Capacity of 132 KV S/s Rongkhon	4.69	132/33	1x20+3x5 2x20 +2x5	15	Oct-15
10	Increasing Capacity of 132 KV S/s Mawlai	50	132/33	3 x 20 2 x 50	40	Sep-16
11	132 KV substation at Nongpoh	25	132/33	2 x 20	40	Mar-18
12	132 KV Sub Station at Balat.	23.20	132/33	2 x 20	40	Mar-19
Total: 132/33kV Transformers		**191.88**			**625**	

Table 51: Planned ISTS Transmission Lines

Sl. No.	Name of the Project	Project Cost (in Crores)	Voltage level (KV)	Total Ckt-km	Target Date
1	LILO of 132KV Nangalbibra - Agia line at Mendipathar	5	132	4.57	Aug-15
2	Second Circuit of 132KV Agia-Nangalbibra line	21.19	132	92.15	Aug-15
3	LILO of 132KV D/C line Umtru - Kahelipara line at Killing s/s	29.52	132	11.00	Mar-18
4	LILO of 2nd circuit 132KV Agia-Nangalbibra line at Mendipathar	7	132	5.00	Mar-18
TOTAL		**62.71**		**112.72**	

Table 52: Transmission Lines Planned for System Strengthening

Sl No.	Name of the Project	Project Cost (in Crores)	Voltage level (KV)	Total Ckt. Km	Target Date
1	220 kV D/C Byrnihat (Killing) – Mawngap – New Shillong line	WB	220	244	Mar-19
2	Construction of 132KV D/C LILO MLHEP – Khliehriat line at Mynkre	WB	132	68	Mar-19
3	Construction of 132KV D/C Phulbari-Ampati Line	WB	132	138	Mar-19
4	Construction of the 132 KV S/C line on D/C towers from Mawphlang substation to Balat	41.40	132	50	Mar-19
5	Construction of 132KV D/C LILO on Mawlai-Cherra S/C Line at Mawngap Substation	4.97	132	7.38	Mar-16
6	132KV multi circuit line from 220/132KV Killing substation to EPIP-I substation and 132KV double circuit line from 220/132KV Killing substation to EPIP-II substation	21.74	132	20.284	Mar-16
7	Construction of 132KV single circuit line on double circuit towers from Rongkhon substation to Ampati	16.75	132	32.77	Oct-15
8	Construction of 132KV D/C LILO line of 132 KV S/C Rongkhon-Ampati line at Prahari Nagar	14.39	132	6	Sep-18
9	LILO of NEIGRIHMS – Khliehriat line at Lad Nongkrem	5.55	132	3	Mar-16
10	Construction of 132KV D/C LILO of 132KV S/C NEHU-Khliehriat line at Jowai (Mustem)	4.34	132	2	Aug-15
11	132KV single circuit line from New Umtru to EPIP-II and from New Umtru HEP to old Umtru HEP	7.66	132	1.68	Mar-16
12	LILO of 132 KV D/C transmission line from Kyrdemkulai (Stage-III HEP) to Umtru Power Station	15.00	132	7	Mar-18
	Total	**131.8**		**580.114**	

Table 53: Inter-State Transmission Lines in Meghalaya

Sl. No.	Line Name	Ckts.	Line Length (Ckt. km)	Conductor
400 kV Lines				
1	400 kV LILO at Killing line – I	S/C	2.214	Twin Moose
2	400 kV LILO at Killing line – II	S/C	2.214	Twin Moose
220 kV Lines				
1	Misa - Byrnihat Line - I	S/C	113.42	Zebra
2	Misa - Byrnihat Line - II	S/C	113.42	Zebra
132 kV Lines				
1	132 kV Lumshnong-Ratacherra (Badarpur) line	S/C	24.56	Panther – Single
2	132kV Khliehriat(PG) – Badarpur(PG) Line	S/C	77	Panther – Single
3	132 kV Khliehriat - Khliehriat (PG) Line - I	S/C	8.00	Panther – Single
4	132 kV Khandong–Khliehriat(PG)	S/c	41.00	Panther – Single
5	132 kV Khandong – Khliehriat(PG)	S/c	43.00	Panther – Single
6	132 kV Khliehriat - Khliehriat(PG) Line - II	S/C	5.35	Panther – Single
7	(a) 132 kV Umtru P/S- Bashista (Kahelipara) Line - I	D/C	23.36	Panther – Single
8	(a) 132 kV Umtru P/S- Sarusajai Line - I	S/C	17.72	Panther – Single
9	(b) 132 kV Umtru P/S- Sarusajai Line - II	S/C	17.72	Panther – Single

Sl. No.	Line Name	Ckts.	Line Length (Ckt. km)	Conductor
10	132 kV Agia - Nangalbibra line	S/C	92.15	Panther – Single
11	132 kV Agia – Nangalbibra line LILO at Mendipathar S/S	D/C	4.57	Panther – Single

Table 54: Existing Interstate Substations (in MVA)

Sl. No.	Name	Voltage Ratio (kV)	Transformation Capacity (In MVA)
1	Killing	400/220	630
2	Sarusajai (Assam)	220/132	100
3	Killing	220/132	320
4	Agia (Assam)	220/132	100
Total Transformation Capacity (in MVA)			**1150**

Table 55: Existing Intrastate Transmission Lines (in CKT. KM)

Sl. No.	Name of the Project	Ckts.	Total Ckt-km
1	132 kV NEHU - Khliehriat – I [SC=52.56 Km, DC=2.23 Km]	SC / DC	54.79
2	132 kV Stage - I - Mawlai line	SC	12.06
3	132 kV Stage - I - Umiam substation line	SC	5.06
4	132 kV Umiam substation - NEHU line	SC	6.20
5	132 kV Stage - III - Stage - IV line – I	SC	8.02
6	132 kV Stage - III - Stage - IV line – II	SC	9.69
7	132 kV Stage - I - Stage - II line	SC	3.00
8	132 kV Nangalbibra - Tura line	SC	68.71
9	132 kV Khliehriat - Lumshnong S/s line	SC	23.80
10	132 kV NEHU - Mawlai line [SC=5.63 Km, DC=2.23 Km]	SC / DC	7.86
11	132 KV NEHU substation - NEIGRIHMS line	SC	6.73
12	132 kV NEIGRIHMS - Khliehriat line	SC	62.83
13	132 kV Mawlai - Mawphlang line [SC=6.51 Km, DC=11.07 Km, LILO=2.68Km]	SC / DC	20.26
14	132 kV Mawphlang - Nongstoin line [SC=53.60 Km, LILO=2.68 Km]	SC	56.28
15	132 kV Nongstoin - Nangalbibra line	SC	57.13
16	132 kV Mawlai - Cherra line [SC=31.07 Km, DC=11.07 Km]	SC / DC	42.14
17	132 kV Lumshnong to M/s CMCL	SC	0.30
18	132 kV Lumshnong to M/s MCL	SC	3.27
19	132 kV Lumshnong to M/s JUD Cements	SC	1.87
20	132 kV Lumshnong to M/s Hill Cements	SC	5.50
21	132 kV Lumshnong to Adhunik Cements	SC	3.64
22	132 kV EPIP- I to M/s Shyam Century Ferro Alloys Ltd.	SC	0.25
23	132 kV EPIP- II to M/s Trishul Hitech Pvt. Ltd.	SC	0.44
24	132 kV EPIP - II to M/s Nalari Ltd.	SC	0.12
25	132 kV EPIP - I to M/s Maithan Smelters (P) Ltd.	SC	0.44
26	132 kV EPIP - I to M/s Greystone Ispat Ltd.	SC	0.40
27	132 kV line tapping to M/s Nezone Industries Ltd.	SC	0.32
28	132 kV EPIP- I to M/s Sai Prakash Ltd.	SC	4.44
29	132 kV EPIP-I to M/s Adhunik Meghalaya Steels (P) Ltd. [SC=0.09, DC=0.004]	SC / DC	0.09
30	132 kV EPIP-I to M/s Meghalaya Carbide Ltd. (disconnected)	SC	0.27
31	132 kV EPIP-II to M/s Meghalaya Sova Ispat Alloys Pvt. Ltd.[SC=0.07, DC=0.56	SC / DC	0.07
32	132 kV line from Umiam substation to M/s RNB Cements Ltd.	SC	0.32

Sl. No.	Name of the Project	Ckts.	Total Ckt-km
33	132 kV line from Tapping point of 132 kV Leshka-Khliehriat line to M/s GVIL	SC	2.18
34	(a) 132 kV Umtru - EPIP - II line - I	SC	0.70
35	(b) 132 kV Umtru - EPIP - II line - II	SC	0.70
36	(a) 132 kV EPIP - I - EPIP - II line - I	SC	3.03
37	(b) 132 kV EPIP - I - EPIP - II line - II	SC	3.03
38	(a) 132 kV Stage - I P/S - Stage - III P/S line - I	SC	17.54
39	(b) 132 kV Stage - I P/S - Stage - III P/S line - II	SC	17.54
40	(a) 132 kV Stage - III P/S - Umtru P/S line - I	SC	41.11
41	(b) 132 kV Stage - III P/S - Umtru P/S line - II	SC	41.11
42	(a) 132 kV Stage - IV - Umtru P/S line - I	SC	29.86
43	(b) 132 kV Stage - IV - Umtru P/S line - II	SC	29.86
44	(a) 132 kV Leshka H.E.P. - Khliehriat line - I	SC	26.47
45	(b) 132 kV Leshka H.E.P. - Khliehriat line - II	SC	26.47
46	(a) 132 kV Killing - EPIP-II line - I	SC	10.27
47	(b) 132 kV Killing - EPIP-II line - II	SC	10.27
48	(a) 132 kV Stage-I Power Station to Mawphlang line - I	SC	33.07
49	(b) 132 kV Stage-I Power Station to Mawphlang line - II	SC	33.07
50	(a) 132 kV Lumshnong to M/s Hill Cements & Adhunik Cements line – I	SC	3.81
51	(b) 132 kV Lumshnong to M/s Hill Cements & Adhunik Cements line – II	SC	3.81
52	(a) 132 kV EPIP - I to M/s to M/s Greystone Ispat Ltd line - I	SC	0.26
53	(b) 132 kV EPIP - I to M/s to M/s Greystone Ispat Ltd line - II	SC	0.26
54	(a) 132 kV EPIP - I to M/s Sai Prakash Ltd line - I	SC	3.00
55	(b) 132 kV EPIP - I to M/s Sai Prakash Ltd line - II	SC	3.00
56	(a) 132 kV EPIP-I to M/s Adhunik Meghalaya Steel (P) Ltd line - I	SC	0.00
57	(b) 132 kV EPIP-I to M/s Adhunik Meghalaya Steel (P) Ltd line - II	SC	0.00
58	(a) 132 kV EPIP-II to M/s Meghalaya Sova Ispat Alloys Pvt. Ltd. line - I	SC	0.28
59	(b) 132 kV EPIP-II to M/s Meghalaya Sova Ispat Alloys Pvt. Ltd. line – II	SC	0.28
60	132 kV Lumshnong to M/s MPL	SC	0.30
TOTAL			**807.58**

Table 56: Existing Intrastate Substation Capacity (In MVA)

Sl. No.	Name of the station	Voltage level (in kV)	No. x Rating (in MVA)	Capacity (in MVA)
1	Mawlai	132/33	3 x 20	60
2	NEHU	132/33	2 x 20	40
3	NEIGRIHMS	132/11	2 x 10	20
4	Khliehriat	132/33	2 x 20	40
5	Lumshnong	132/33/11	1 x 10	10
6	Cherra	132/33	1 x 12.5	12.5
7	Nongstoin	132/33	1 x 12.5	12.5
8	Umiam	132/33	2 x 20	40
9	Rongkhon	132/33	2 x 20 + 3 x 5	55
10	Nangalbibra	132/33	2 x 12.5	25
11	EPIP - I (Rajabagan)	132/33	2 x 20	40
12	EPIP-II (Norbong)	132/33	1 x 50 + 1 X 20	70
13	Mawphlang (Mawngap)	132/33	2 x 20	40
Total Capacity Available (in MVA)				**465**

ANNEXURE – 4

Table 57: Work proposed Under DDUGVY scheme

Particulars	Unit	Qty	Amount in Crores
A. Feeder Separation			
33 KV Feeder	Ckt. Kms.	0	0
11 KV Feeder	Ckt. Kms.	0	0
LT Line	Ckt. Kms.	0	0
Distribution Transformer	MVA/Nos	0	0
Total			
B. Strengthening of Sub-Transmission and Distribution Network			
33/11 KV SS :			
New substation	MVA	75	74.94
Additional Transformer		5.7	0.30
Augmentation Enhancement		109.6	29.54
Brief Scope of R&M works in existing 33/11 KV or 66/11KV substations (details of Substations & works to be provided in DPR)	Nos	28	13.04
33 KV feeders	Ckt. Kms.		
New	Ckt. Kms.	492	94.04
Augmentation	Ckt. Kms.	539.3	84.43
11 KV feeders			
New	Ckt. Kms.	4655.13	620.35
Augmentation	Ckt. Kms.	2067.5	79.18
11 KV Bay Extension	Nos	16	3.83
11 KV Line Sectionalisers	Nos	186	0.94
Distribution Transformer			
New	MVA	1230.75	87.77
Augmentation		289.605	17.49
R&M	Nos	1412	28.37
HVDS		16	0.75
LT Line	Ckt. Kms.		
New	Ckt. Kms.	4575.86	266.02
Augmentation	Ckt. Kms.	1484.57	51.22
BPLmRhh	Nos.	10589	3.18
Capacitor Bank		47	0.03
Aerial Bunched Cables	Ckt. Kms.	322.98	44.70
Metering			
a) Feeder & Boundary (33Kv)	Nos.	94	2.04
b) Feeder & Boundary (11Kv)	Nos.	223	3.29
Distribution Transformer	Nos.	4412	31.46
Consumer	Nos.		
3-Phase	Nos.	1500	6.00
1-Phase	Nos.	14000	32.00
Grand Total			**1586.59**

ANNEXURE – 5

MNRE Schemes/options for electrification of remote households

SCHEMES FOR INDIVIDUAL HOUSEHOLDS

OPTION I	
System Proposed	100 Wp Solar system
Solar PV Module	100 Wp
Battery Storage (Tubular type)	12V, 75 AH
Estimated Project Cost	**Rs. 25,000/**

The above system is adequate to meet consumer demand with autonomy for two (2) non-sunshine days for consumption profile of estimated 0.3 units per day considering following inclusions in the scheme:

Inclusions	Nos.	Unit Load (W) [DC]	Total Load (W)	Hours of use per day	Energy Consumption (kWh/day)
D.C. operated LED Lights	3	8	24	4	0.096
D.C. operated LED Lights	2	5	10	4	0.040
D.C. Fan	1	12	12	10	0.120
D.C. B&W TV	1	12	12	4	0.048
Mobile Charger	1	5	5	3	0.015
Total					**0.319**

OPTION 2	
System Proposed	200 Wp Solar system
Solar PV Module	200 Wp
Battery Storage (Tubular type)	12V, 75 AH
Estimated Project Cost	**Rs. 50,000/**

The above system is adequate to meet consumer demand with autonomy for two (2) non-sunshine days for consumption profile of estimated 0.6 units per day considering following inclusions in the scheme:

Inclusions	Nos.	Unit Load (W) [DC]	Total Load (W)	Hours of use per day	Energy Consumption (kWh/day)
D.C. operated LED Lights	3	8	24	6	0.144
D.C. operated LED Lights	2	5	10	6	0.060
D.C. Fan (1*24W or 2*12W)	2	12	24	12	0.288
D.C. Color TV	1	30	30	4	0.120
Mobile Charger	1	5	5	3	0.015
Total					**0.627**

SCHEMES FOR VILLAGE WITH A CLUSTER OF "HOUSEHOLDS" – OFF GRID

OPTION III	
Target Cluster of Households	15
Total Load (500 Whrs/ Household)	7500 Whrs
System Proposed	Solar PV Mini Grid And Central Control Room
Solar PV Panel	2.5 KWp
Battery Storage	48V, 600AH
Off Grid PCU (Inverter and Charge controller)	48 V, 2.5 KW
Other balance of System Components	As per actual
Estimated Project Cost	**Rs. 7,50,000/**

Inclusions	Nos.	Unit Load (W) [DC]	Total Load (W)	Hours of use per day	Energy Consumption (kWh/day)
A.C. operated LED Lights	3	8	24	6	0.144
A.C. operated LED Lights	2	5	10	6	0.060
Power for A.C. Fan and or Power for A.C. Loads like Color TV, Set top/ PC and Mobile Charger etc.	1	50	50	6	0.300
Total					**0.504**

OPTION IV	
Target Cluster of Households	50
Total Load (700 Whrs/ Household)	35,000 Whrs
System Proposed	Solar PV Mini Grid And Central Control Room
Solar PV Panel	12.5 KWp
Battery Storage	240V, 600AH
Off Grid PCU (Inverter and Charge controller)	240V, 12.5 KW
Other balance of System Components	As per actual
Estimated Project Cost	**Rs. 30,00,000/**

Inclusions	Nos.	Unit Load (W) [DC]	Total Load (W)	Hours of use per day	Energy Consumption (kWh/day)
A.C. operated LED Lights	3	8	24	6	0.144
A.C. operated LED Lights	2	5	10	6	0.060
Power for A.C. Fan and or Power for A.C. Loads like Color TV, Set top/ PC and Mobile Charger etc.	1	50	50	10	0.500
Total					**0.704**

PROPOSED SCHEME:

- *MNRE may provide subsidy at the rate of 40%.through NCEF* A network of local technicians will have to be created for service and repair.
- Some local agencies / NGO's will have to be involved to ensure upkeep and proper use through awareness and training of users.
- The beneficiary may be asked to keep some fixed amount as "Reserves" like for battery replacement in future

ANNEXURE – 6

Table 58: Firm entitlement in FY 15 (in MW)

Source	Type	Latest Firm Entitlement in MW
Availability Within State		
Own Generating Stations		
Umiam Stage I	Hydro	36.00
Umiam Stage II	Small Hydro	20.00
Umiam Stage III	Hydro	60.00
Umiam Stage IV	Hydro	60.00
MLHEP	Hydro	126.00
UMTRU	Small Hydro	11.20
SONAPANI	Small Hydro	1.50
Sub-total - Own Generating Stations		**314.70**
Availability Within State		**314.70**
Availability Outside State		
Central Generating Stations		
AGBPP	Gas	20.00
AGTPP	Gas	6.00
OTPC Pallatana	Gas	78.47
Kopili	Hydro	25.00
Kopli-Ext	Hydro	2.19
RANGANADI	Hydro	27.00
KhanDong	Hydro	6.00
Doyang	Hydro	5.00
Loktak	Hydro	8.11
Central Generating Stations		**177.77**
Availability Outside State		**177.77**
Total Availability from firm sources		**492.47**

Table 59: Year-wise Projection of Power Purchase/Availability (in MU)

Source	Average Per Units Charges (Rs/kWh)	Energy Availability in MU					Power Purchase Cost (in Rs Crores)				
		FY 15	FY 16	FY 17	FY 18	FY 19	FY 15	FY 16	FY 17	FY 18	FY 19
Availability within State											
Own Generating Stations											
Umiam Stage I	1.45	115	115	115	115	115	17	17	17	17	17
Umiam Stage II	1.67	45	45	45	45	45	7	7	7	7	7
Umiam Stage III		140	140	140	140	140	0	0	0	0	0
Umiam Stage IV	1.28	202	202	202	202	202	26	26	26	26	26
UMTRU	2.23	39	39	39	39	39	9	9	9	9	9
SONAPANI	1.36	5	5	5	5	5	1	1	1	1	1
MLHEP	3.08	478	478	478	478	478	147	147	147	147	147
Own Generating Stations		**1024**	**1024**	**1024**	**1024**	**1024**	**207**	**207**	**207**	**207**	**207**

Source	Average Per Units Charges (Rs/kWh)	Energy Availability in MU					Power Purchase Cost (in Rs Crores)				
		FY 15	FY 16	FY 17	FY 18	FY 19	FY 15	FY 16	FY 17	FY 18	FY 19
New Stations-Own & Private											
New Umturu	2.58	0	0	190	190	190	0	0	49	49	49
Ganol	2.50	0	0	0	66	66	0	0	0	17	17
Lakroh	2.50	0	0	11	11	11	0	0	3	3	3
Riangdo	2.50	0	0	0	0	17	0	0	0	0	4
New Stations-Own & Private		**0**	**0**	**201**	**267**	**284**	**0**	**0**	**52**	**68**	**72**
Renewable Energy Sources -Upcoming											
Solar PP	7.00	0	0	0	0	34	0	0	0	0	24
Renewable Energy Sources -Upcoming		**0**	**0**	**0**	**0**	**34**	**0**	**0**	**0**	**0**	**24**
Availability Within State	**0.00**	**1024**	**1024**	**1225**	**1291**	**1342**	**207**	**207**	**259**	**275**	**303**
Availability Outside State											
Central Generating Stations											
Kopili	0.74	85	85	85	85	85	6	6	6	6	6
Kopli-Ext	2.59	8	8	8	8	8	2	2	2	2	2
RANGANADI	3.91	131	131	131	131	131	51	51	51	51	51
KhanDong	3.50	17	17	17	17	17	6	6	6	6	6
Doyang	7.15	23	23	23	23	23	16	16	16	16	16
AGBPP	4.13	128	128	128	128	128	53	53	53	53	53
AGTPP	4.46	38	38	38	38	38	17	17	17	17	17
Loktak	2.96	51	51	51	51	51	15	15	15	15	15
FSTPS	3.96	0	0	0	0	0	0	0	0	0	0
KHSTPS-I	3.19	0	0	0	0	0	0	0	0	0	0
KHSTPS-II	3.40	0	0	0	0	0	0	0	0	0	0
TSTPS	2.25	0	0	0	0	0	0	0	0	0	0
OTPC Pallatana	2.57	341	341	341	341	341	88	88	88	88	88
Central Generating Stations		**822**	**822**	**822**	**822**	**822**	**255**	**255**	**255**	**255**	**255**
CGS - New											
Bongaigaon Stage 1	3.28	0	108	108	108	108	0	35	35	35	35
Bongaigaon Stage 2	3.28	0	0	108	108	108	0	0	35	35	35
Bongaigaon Stage 3	3.28	0	0	0	108	108	0	0	0	35	35
Kameng	5.00	0	0	90	90	90	0	0	45	45	45
Pare	5.00	0	0	54	54	54	0	0	27	27	27
Turial	5.00	0	0	26	26	26	0	0	13	13	13
AGTPP Combined	4.06	0	10	10	10	10	0	4	4	4	4
CGS - New		**0**	**118**	**396**	**504**	**504**	**0**	**40**	**160**	**195**	**195**
Availability Outside State		**821.99**	**940**	**1218**	**1326**	**1326**	**255**	**294**	**414**	**450**	**450**
Less: Interstate Losses		*24.33*	*28*	*36*	*39*	*39*					
Net Availability outside state		**797.66**	**913**	**1182**	**1287**	**1287**					
Total Availability from firm sources		**1822**	**1937**	**2407**	**2578**	**2629**	**462**	**501**	**673**	**725**	**753**

Table 60: Year-wise Projection of Category-wise Revenue (In Rs Crores) – Base Case

Categories	ABR		Projections				
	FY 15	FY 16	FY 15	FY 16	FY 17	FY 18	FY 19
Domestic Category							
Domestic - Rural	4.04	4.45	61	73	85	110	135
Domestic - Urban	4.04	4.45	100	122	139	166	191
LT Category - Other than domestic							
Commercial (CLT)	6.31	6.85	39	47	51	56	61
Industrial (ILT)	6.64	7.00	3	4	4	4	4
Agriculture (AP)	2.98	3.53	0	0	0	0	0
Public Lighting (PL)	5.66	6.15	1	1	1	1	1
Water Supply (WSLT)	6.01	6.49	5	6	6	7	7
General Purpose	6.08	6.35	15	18	21	25	29
Crematorium	3.58	3.92	0	0	0	0	0
HT & EHT CATEGORY							
Water Supply (WS HT)	5.65	6.53	18	22	23	25	26
Bulk Supply	5.96	6.66	49	58	61	64	68
Commercial (CHT)	6.42	7.05	15	18	21	24	27
Industrial (IHT)	6.18	6.86	137	152	152	152	152
Industrial (IEHT)	5.82	6.37	105	114	114	114	114
Assam (33kV)	5.52	5.81	11	12	13	14	15
Grand Total			**559**	**647**	**692**	**761**	**829**

ANNEXURE – 7

Distribution

The Roll-Out Plan for Distribution for Supply Hours and Connection to Un-Electrified Households in urban areas is summarized below:

Table 61: Roll Out Plan Distribution (Supply Hours and Electrification of the Un-Electrified Households) – Urban

District Name	Current Status		Target Electrification of Un-Electrified Households				Target 24 Hours Supply Hours
	Un Electrified Households	Supply Hours	FY 16	FY 17	FY 18	FY 19	
Jaintia Hills	610	23-24 hours	0	244	366	0	FY 18 and beyond on continuous basis
Ri Bhoi	2,445		0	978	1467	0	
East Khasi Hills	7,697		0	3079	4618	0	
South Garo Hills	1,013		0	405	608	0	
West Garo Hills	5,297		0	2119	3178	0	
East Garo Hills	3,286		0	1314	1972	0	
West Khasi Hills	320		0	128	192	0	
Total	**20,668**		**0**	**8,267**	**12,401**	**0**	

As seen from the above, the Meghalaya is already providing power supply to urban areas for more than 23 Hours. Hence it should endeavor to provide 24 hours uninterrupted power supply to all urban domestic areas from FY 17 onwards.

The roll out plan for Distribution for extending supply hours and connection to un-electrified households in rural areas is shown below:

Table 62: Roll Out Plan Distribution (Supply Hours and Electrification of the Un-Electrified Households) – Rural

District Name	Current Status		Target Electrification of Un-Electrified Households				Target 24 Hours Supply Hours
	Un Electrified Households	Supply Hours	FY 16	FY 17	FY 18	FY 19	
Jaintia Hills	21,357	22-24 hours	1068	5339	10678	4271	FY 18 and beyond on continuous basis
Ri Bhoi	10,274		514	2569	5137	2055	
East Khasi Hills	35,926		1796	8981	17963	7185	
South Garo Hills	11,940		597	2985	5970	2388	
West Garo Hills	56,179		2809	14045	28089	11236	
East Garo Hills	31,862		1593	7965	15931	6372	
West Khasi Hills	19,753		988	4938	9877	3951	
Total	**1,87,290**		**9,365**	**46,822**	**93,645**	**37,458**	

Barring operational constraints, the state should endeavor to put its best foot forward to connect un-electrified households as per the plan detailed above and simultaneously ensure 24 hours uninterrupted supply to all the rural consumers of the state.

Further, given the adequacy of the planned capacity addition in generation, transmission and distribution, the state should also ensure 24 hours supply to all other consumers of the state.

The year-wise operational efficiency improvement targets for all electrical divisions (on the basis of actual information of FY 14) are detailed below:

Table 63: Roll Out Plan Distribution (Efficiency Improvement Targets) – T&D Losses

S. No.	Name of Circles	T&D Losses				
		Actuals	Targeted Trajectory			
		FY 15	FY 16	FY 17	FY 18	FY 19
1	Shillong	19.91%	19.00%	18.50%	18.50%	18.50%
2	Eastern	30.24%	26.00%	24.50%	24.50%	24.50%
3	Western	16.83%	15.83%	15.60%	15.60%	15.60%
4	Central	48.58%	40.00%	38.00%	38.00%	38.00%
5	East Garo Hills	73.42%	65.00%	62.00%	55.25%	50.30%
6	West Garo Hills	54.81%	51.81%	49.78%	45.00%	45.00%
Overall		**32.62%**	**28.36%**	**26.98%**	**25.61%**	**25.24%**

Table 64: Roll Out Plan Distribution (Efficiency Improvement Targets) – Collection Efficiency

S. No.	Name of Circles	T&D Losses				
		Actuals	Targeted Trajectory			
		FY 15	FY 16	FY 17	FY 18	FY 19
1	Shillong	100.15%	99.00%	99.00%	99.00%	99.93%
2	Eastern	87.66%	97.00%	97.00%	97.50%	99.93%
3	Western	103.31%	99.00%	99.00%	99.00%	99.93%
4	Central	90.13%	96.00%	97.00%	97.50%	99.93%
5	East Garo Hills	55.21%	86.50%	90.50%	93.50%	99.93%
6	West Garo Hills	95.77%	98.00%	98.00%	98.00%	99.93%

Table 65: Roll Out Plan Distribution (Efficiency Improvement Targets) – AT&C Losses

S. No.	Name of Circles	AT&C Losses				
		Actuals	Targeted Trajectory			
		FY 15	FY 16	FY 17	FY 18	FY 19
1	Shillong	19.79%	19.81%	19.32%	19.32%	18.56%
2	Eastern	38.84%	28.22%	26.77%	26.39%	24.55%
3	Western	14.08%	16.68%	16.44%	16.44%	15.66%
4	Central	53.66%	42.40%	39.86%	39.55%	38.04%
5	East Garo Hills	85.32%	69.73%	65.61%	58.16%	50.33%
6	West Garo Hills	56.73%	52.78%	50.78%	46.10%	45.04%
Overall		**34.94%**	**29.79%**	**28.29%**	**26.79%**	**25.29%**

The targets for individual divisions will suitably be revisited in case of split of existing circles into new circles in future.

The Roll-Out Plan for Capacity addition/ augmentation is summarized below:

Table 66: Roll Out Plan Distribution (Capacity Augmentation) – 33 kV Substations (in MVA)

Sl. No.	Name of Division	Total Capacity	Rollout Target for Capacity Addition					Total Expected Capacity by March 19
			FY 16	FY 17	FY 18	FY 19	Total	
1	DGM(East)	57.5	5	25	10	5	45	102.5
2	DGM(West)	58.35	15	30	10	20	75	133.35
3	East Khasi Hills	30.76	4.8	1.6	2.5	60.2	69.1	99.86
4	West Khasi Hills	32.0	-	5.7	5	10.2	20.9	52.9
5	Jowai Dist Division	30.44	5.0	-	7.5	2.5	15	45.44
6	Khliehriat Dist Division	30.96	-	20	-	57.5	77.5	108.46
7	Ri Bhoi Dist Division	27.15	5	-	10	27.5	42.5	69.65
8	Byrnihat Dist Division	25.5	-	5	-	17.5	22.5	48
9	Tura Dist Division	29.10	-	12.5	15	17.5	45	74.1
10	West Garo Hills Dist Division	20.45	3.2	2.5	-	68.4	74.1	94.55
11	East Garo Hills Dist Division	39.7	4.8	17.3	10	24.1	56.2	95.9
Total		**381.91**	**42.8**	**119.6**	**70**	**310.4**	**542.8**	**924.71**

Table 67: Roll Out Plan Distribution (Capacity Augmentation) – 33 kV Lines (in Ckt. Km)

Sl. No.	Name of Division	Total Capacity	Rollout Target for Capacity Addition					Total Expected Capacity by March 19
			FY 16	FY 17	FY 18	FY 19	Total	
1	DGM(East)	35.08	1.7	3,5	3,5	0	8.7	43.78
2	DGM(West)	117.68	5	5	8	10	28	145.68
3	East Khasi Hills	187.0	0	4	2	121	127	314
4	West Khasi Hills	219.0	0	8.3	0.5	57	65.8	284.8
5	Jowai Dist Division	273.8	7.6	-	75	-	82.6	356.4
6	Khliehriat Dist Division	122.0	-	-	38	101	139	261
7	Ri Bhoi Dist Division	191.67	16.05	5.35	2.5	150	173.9	365.57
8	Byrnihat Dist Division	82.70	2.9	2.9	-	27	32.8	115.5
9	Tura Dist Division	127.0	-	10.74	4	61	75.74	202.74
10	West Garo Hills Dist Division	217.75	13	86.6	-	172	271.6	489.35
11	East Garo Hills Dist Division	359.1	-	100.9	7.1	172	280	639.1
Total		**1932.78**	**46.25**	**227.29**	**140.6**	**871**	**1285.14**	**3217.92**

Table 68: Roll Out Plan Distribution (Capacity Augmentation) –11 kV Lines (in Ckt. Km)

Sl. No.	Name of Division	Total Capacity	Rollout Target for Capacity Addition					Total Expected Capacity by March 19
			FY 16	FY 17	FY 18	FY 19	Total	
1	DGM(East)	129.48	2.5	10.5	2,05	-	15.05	144.53
2	DGM(West)	448.99	10	13.2	13	6	42.2	491.19
3	East Khasi Hills	2293	56	80	-	284.5	420.5	2713.5
4	West Khasi Hills	1356	24.2	108	4.4	105.8	242.4	1598.4
5	Jowai Dist Division	662.82	-	5.19	2.8	130.5	138.49	801.31
6	Khliehriat Dist Division	785.5	-	-	34	243.1	277.1	1062.6
7	Ri Bhoi Dist Division	1107.48	5.57	6,23	3	92.8	107.6	1215.08
8	Byrnihat Dist Division	230.27	-	-	-	92.8	92.8	323.07
9	Tura Dist Division	818.72	-	12.5	6	54.6	73.1	891.82
10	West Garo Hills Dist Division	1970.5	-	132.6	-	989.5	1122.1	3092.6
11	East Garo Hills Dist Division	2582.48	-	129.25	16.25	1460.3	1605.8	4188.28
Total		**12385.24**	**98.27**	**497.47**	**81.5**	**3459.9**	**4137.14**	**16522.38**

Table 69: Roll Out Plan Distribution (Capacity Augmentation) – LT Lines (in Ckt. Km)

Sl. No.	Name of Division	Total Capacity	Rollout Target for Capacity Addition					Total Expected Capacity by March 19
			FY 16	FY 17	FY 18	FY 19	Total	
1	DGM(East)	381.15	3.76	3.76	-	-	7.52	388.67
2	DGM(West)	776.23	14	8	12	6.6	40.6	816.83
3	East Khasi Hills	2000	16	-	-	596.7	612.7	2612.7
4	West Khasi Hills	1573	-	10	43.8	1046.2	1100	2673
5	Jowai Dist Division	983	1.96	1.96	2.9	259	265.82	1248.82
6	Khliehriat Dist Division	771	-	-	-	262.5	262.5	1033.5
7	Ri Bhoi Dist Division	1155.92	-	6.5	2.6	141.5	150.6	1306.52
8	Byrnihat Dist Division	176.72	-	-	-	141.5	141.5	318.22
9	Tura Dist Division	1893.92	-	-	3	25	28	1921.92
10	West Garo Hills Dist Division	3191.98	-	-	5	638.1	643.1	3835.08
11	East Garo Hills Dist Division	4878.47	-	-	12	1443.7	1455.7	6334.17
Total		**17781.39**	**35.72**	**30.22**	**81.3**	**4560.8**	**4708.04**	**22489.43**

Table 70: Roll Out Plan Distribution (Capacity Augmentation) – Distribution Transformers (in MVA)

Sl. No.	Name of Division	Total Capacity	Rollout Target for Capacity Addition					Total Expected Capacity by March 19
			FY 16	FY 17	FY 18	FY 19	Total	
1	DGM(East)	124.08	8.21	3.73	9.92	0	21.86	145.94
2	DGM(West)	68.85	10.08	4.58	3.67	0	18.33	87.18
3	East Khasi Hills	52.69	0.9	0.41	8.89	15.9	26.1	78.79
4	West Khasi Hills	47.2	2.21	1	12.01	19.14	34.36	81.56
5	Jowai Dist Division	37.95	0.61	0.28	2.74	4.3	7.93	45.88
6	Khliehriat Dist Division	36.02	0.92	0.42	4.12	6.44	11.9	47.92
7	Ri Bhoi Dist Division	57.21	0.5	0.23	2.32	3.2	6.25	63.46
8	Byrnihat Dist Division	25	0.34	0.15	1.54	2.14	4.17	29.17
9	Tura Dist Division	44.97	3.33	1.51	2.45	0.25	7.54	52.51
10	West Garo Hills Dist Division	48.87	0	0	5.18	9.62	14.8	63.67
11	East Garo Hills Dist Division	55.75	1.2	0.55	10.03	9.38	21.16	76.91
Total		**598.59**	**598.59**	**28.3**	**12.86**	**62.87**	**70.37**	**772.94**

The concerned officials of the Electrical Divisions should be apprised about their individual targets and effective and robust monitoring mechanism is required to be evolved and put in place to achieve these targets.