

Power Situation in Maharashtra in Perspective of Agricultural Load-A Case Study

Prof. M. M. Tayade
Department of Electrical Engineering
MGICOET Shegaon.
manishkumar.tayade@gmail.com

Prof. V. A. Ghodeswar
Department of Electrical Engineering,
MGICOET Shegaon.
ghodeswarvaibhav@gmail.com

Prof. K. K. Rajput
Department of Electrical Engineering,
MGICOET Shegaon.
kkrajput2702@gmail.com

Dr. C. M. Jadhao
Department of Electronics & Telecommunication Engineering,
MGICOET Shegaon.
cmjadhao@gmail.com

Prof. S. A. Deshmukh
Department of Electrical Engineering,
MGICOET Shegaon.
deshshweta28@gmail.com

Abstract- This paper is focusing on a very important part of the power consumption in Maharashtra. The paper is presenting somewhat surprising facts along with the discussion of the core topics related to power situation in Maharashtra. The paper also consist of the valuable data which is directly collected from the Manora AG feeder of the Washim circle of Amravati zone in Maharashtra. The data analysis is also presented here along with discussion over that. This paper try to analyze some of very important and notifying problems faced by the top ranked electricity distribution utility of the world in focus of the actual reports taken in the energy Audit of the Manora AG feeder. In accordance with all the discussion, the paper try to suggest some solutions to improve overall situation of the power sector especially the distribution sector of the state electricity board of the Maharashtra and hope that these solution proves really beneficial to not only to the utility side but also to the end consumer side.

Keywords- R-APDRP (Restructured- Accelerated Power Development and Reforms Program) , MSEDCL(Maharashtra State Electricity Distribution Co. Ltd.), Agricultural load.

I. INTRODUCTION

Today electricity is not only an important topic but is an infrastructure for socio – economic development of mankind. The use of electrical energy per capita of a country influences the standard of living index of the people of a great extent. Most of the socio-economic problems of the India has the root cause the shortage of electricity in the rural areas. The scarcity of electricity in India strongly has two reasons. One is due to the insufficient production & other one is the improper management of transmission of electricity. Both of these led to a shortage of 17000 MW in total. This shortage in Maharashtra is big enough. Some steps are being taken to solve this. [1]

MSEB (Maharashtra State Electricity Board) involved 4 companies. Among them MSEDCL (Maharashtra State Electricity Distribution Co. Ltd.) is responsible for the distribution processes and it's billing for the state. MSEDCL is a public sector undertaking (PSU). It is run by the Government of Maharashtra. It has the second rank among all electricity distribution companies in the world. The first one is State Grid Corporation of China (SGCC). MSEDCL distributes electricity to the entire Maharashtra. Except only some part of Mumbai city where distributors are Reliance Energy, BEST company and Tata Power. [5]

The MSEB has a consumer base of about there are near about 1.93 crores of consumers to the MSEB across 3.08 lakh sq. km which is divided into 41,095 villages and 457 towns. The MSEB has created: 14 zones, 44 circles, 142 Division, 658 sub-divisions, 3229 section offices for efficient management of

distribution of the power to all over the state. The infrastructure of the MSEB includes 34,151 sub-stations of the 33kV with the transformation capacity of 55,218 MVA along with near about 10,334 HV feeders and more than 2 lakh distribution transformers. There are many projects undertaken by the MSEB just like the R-APDRP, Load management and Rajiv Gandhi Gramin Vidhyutikarn Yojana (RGGVY). All these projects are aiming to minimize the losses and to improve the efficiency of both billing and collection and with this trying to offer better consumer services. [5]

This paper is going to discuss briefly the present situation of power consumption in perspective of agricultural load and try to focus on very surprising fact related to this with the problems, challenges and the solutions for the same.

II. LITERATURE SURVEY

CTARA (*Centre for Technology Alternatives for Rural Areas*) IIT Bombay group is working on various projects analysing the problems faced by the MSEB. Maharashtra Electricity Regulatory Commission has been asking for a third party study since 2006. CTARA Group take a responsibility to suggest the best one manging and processing methodology for the efficient working of the MSEB. CTARA publishes many reports regarding to the solution for different problems faced by the MSEB. In case of agricultural load CTARA carried one type of Energy Audit which aims to find a reliable and efficient methodology to determine agricultural consumption. It stated that efficient metering and clarity in

supply to agriculture will lead to better health of the distribution utility and hence better supply to rural consumers. More than this the greater goal of this effort is to have a crystal clear unmetered agricultural consumption figure.

Along with this some local scientific institutions are also working for the same purpose like PRAYAS ENERGY GROUP from Pune. The document published by such institutions is also helpful for this analysis. And the valuable information published by the Ministry Of Power, central Electricity Authority and the MSEB itself plays the important and ultimate role in this effort.

III. PROBLEM STATEMENT

In 2003, MSEB had supposed that in 2013, Maharashtra should have a demand of 24,000 MW. It also assumed that Maharashtra would generate 30,000 MW in future and hence there will be 6,000 MW in extra. But in 2013, the actual situation was very much different. Maharashtra had the generation only around 15,000 MW, and the demand of around 18,000 MW which meant that the state was in a deficit of about 3,000 MW. The situation isn't a much different after couple of years in 2015. [5]

The generation capacity grew up to half of the approximation. This is a thing of great concern of all. But rather than this the demand is seen to be much lesser than predicted one and that is more disturbing and disheartening because it implies two things. One is that the existing industries didn't grow as expected and the other one is the number of new industries that came to Maharashtra was negligible as compared to the expectations. On other side Maharashtra has lost many industries to Gujarat and Karnataka. The present gradual growth in demand indicates strongly the gradual growth in the population rather than a sharp growth in industrial consumption. [5]

So the question is that- what should be done for the industries to provide a reliable power supply at an affordable rate? If Maharashtra can provide a reliable power supply at an affordable rate to the industries, then the existing industries will definitely flourish and therefore won't go to other states, and in reverse, the new industries will come to Maharashtra. So the point to think of is -what should be done in this power sector so that Make in Maharashtra becomes a grand success?

IV. PRESENT SITUATION

Before we have any suggestion or start to think to ensure that Make in Maharashtra will be successful, we must be aware of the present situation without knowing that every assumption seems to be weak. So let us try to understand what the present situation is.

A. Presently, the demand of power for the Maharashtra is about 18,000 MW. Whereas the installed capacity of generation is about 15,000 MW. This means that the peak deficit is near about 15% whereas the energy deficit is around 12%.

B. In this 21st century also where we are on the edge of high tech era of 4G, there are nearly about 1.5 crore people in Maharashtra who don't have access to electricity. This is

nearly approximately 10% of Maharashtra's population! Again point to be considered is most of these people are from the rural sectors. Surprisingly some of them are not more than 20 kms from Mumbai which is the financial capital of India! Unbelievable but true. Now if you consider that all these people also should have electricity, then the actual deficits will be much higher.

C. Now those parts of Maharashtra who have the electricity, it is also not 100% reliable. It is found that there are power cuts, even in a city like Pune, which is second in importance only to Mumbai. In case of other cities, they have frequently more prolonged power cuts. In rural areas, the condition seen is worst again. There are power cuts almost every single day and they last for many hours, which makes impossible doing anything almost reliable.

D. Because of this the industries rely on diesel generator (DG) sets for reliable power.

E. Consequently there are some problems with these DG sets which burn diesel to produce electricity. They make a pollution and put a strain on the state's and country's economy. Why so? Because this diesel has to be imported. This diesel is becoming more expensive with every passing day and hence declared as a scarce resource. The current dip in rates is an anomaly of sorts. In the coming days, oil will become more expensive. Since it is a scarce resource.

F. Mumbai being the financial capital, gets the most reliable electricity supply in Maharashtra. But the rates touch to sky high.

G. Electricity used for the advertisements purposes is close to Rs.20 per unit, which is too high in comparison to the rates in most Western countries!

H. The tariff rates for the Commercial consumers is near about Rs.12 - 15 per unit. For the industrial consumers it is Rs.8 to Rs.10. Although for the most of residential consumers it is close to Rs.5 per unit, those who consume a lot of electricity pay anywhere from Rs.7 to Rs.10 per unit.

I. All the renewable energy companies are realising their survival going to be very tough. Most of the renewable energy sources in Maharashtra has been founded in the area of wind energy. But the rates for wind energy have plummeted.

J. This is because MSEB wish to buy the energy produced by the wind energy companies but they can't because most of it is generated during the night, when there isn't much demand.

K. Now the day time demand can be provided by Solar PV of industrial and commercial consumers but no one is seen on the considerable level except a few big projects that have been commissioned.

L. All the legally permitted entities have the option of a Renewable Energy Purchase Obligation (RPO) which if they select can make a big business. But it isn't being enforced.

M. Noteworthy thing is that Maharashtra doesn't have a renewable energy policy. At least, the state should adopt a net metering policy, but it doesn't have till now also.[6]

Because of all these and many other problems, many industries are not growing as per the expectation, and hence are shifting to Gujarat or Karnataka. There are many new industries who are expected to come in Maharashtra are not coming. This is the big hurdle on way of development.

V. AGRICULTURAL CONSUMERS

The consumer figure of MSEDCL is near about 2 crore in Maharashtra and revenues they are getting is near about Rs.60,000 crores! The mind-blowing thing is that out of these revenues, 41% of MSEDCL's revenues is contributed by the top 2,500 consumers only.[2]

On the other hand, agricultural consumers consume 26% of the electricity distributed by MSEDCL, and pay back only for 3% of the revenues. And that is if they pay it. Many of these consumers don't pay it back. This is also a mind-blowing statistic![2]

India has always been and presently also an agricultural country. Today, India hold second in the world for the farm output products. 51% of the total workforce is employed in the agriculture as well as its related fields like forestry, logging, and fishing. However, this agricultural field has the contribution of only 17% to India's GDP as noted in 2012. The surprising thing is that this number has been decreasing steadily since Independence. Also one thing that should be noted here is that the declining graph of agriculture in its GDP is because India is one of the fastest growing service sectors, which is growing at 9% year-on-year (YoY) from 2000 and contributing up to 57% of the GDP as recorded in 2012-13.[4]

Though we are following advanced techniques and modern farming ways for irrigation and agriculture, our average yield is only 30% to 50% of the highest average yield in the world.. today India export many products like cotton, fresh fruits, cereals, dry fruits, Basmati rice, wheat, , spices, tea, coffee, and many cash crops, particularly to the Middle East, Southeast Asia, and East Asia. Our these exports contribute about 10% of the total exports, which is not bad at all.[4]

It seems to be very stupid to ignore all these above mentioned fact. Therefore our farmers must be supported by all the ways. With this conclusion if they need the electricity at subsidized rate we must provide them with it. And for what purpose they need electricity ? To pump water out of any water source like the bore-wells or the dams for irrigation of their farms. [4]

VI. THE POLITICAL ECONOMY

Now this thing is crystal clear that we must support our farmers anyway and should give them some sort of subsidy in the electricity they used. Now the question is araised that how much electricity should be provide to them? and at what should be the tarrif rate for them?

Currently, from the survey data presented in next section, most of the farmers are charged on a "per hp" basis, at

the place of a "per unit" as in case of a domestic ones. The rate as declared is Rs.3,000 per hp, for getting 24/7 electricity supply. So from this, if a farmer uses a 3 hp pump in his farm, he will be charged for Rs.9,000 per year, irrespective of how much electricity he has consumed.

Here one thing is again notifying that, farmers do not get 24/7 electricity. They typically get it for six to eight hours, and probably in the night times. The farmers replied this situation with saying that, "This is not that for what we are waiting." Many times their labours refuse to go to the farm in the the night. And lastly the farmers do it self. Irrespective of who does it, there is a risks. As per the reports, death by the snake bites is at the top of the list."

After having look over this we come to the conclusion that the situation is far away from the ideal one. MSEDCL should provide electricity to the farmers when they actually need it. And farmers also need to pay for what they are using. Though MSEDCL is not giving 24/7 electricity to them, but if it is giving them electricity for eight hours, the farmers should pay at least 1/3rd of the amount to MSEDCL?

Although MSEDCL and government officials are declaring that these subsidies are going to farmers, they are not going to all farmers! These subsidies are primarily going to farmers in mainly eight districts: Pune, Baramati, Satara, Sangli, Kolhapur, Ahmednagar, Solapur, and Jalgaon. If we observe these districts, these constitutes the Western Maharashtra.

Now let us have a look at crops which are being grown in these districts. We will find that these districts grow cash crops and no doubt the sugarcane being the most important of them. This means that the the subsidies are going to the rich farmers, the semi-feudal rural elite of Maharashtra. Coincidentally if we study the backgrounds of all the past and present MLAs of Maharashtra, many of them come from these very districts!

This is not simply a coincidence. If we investigate further we got that the people who have been in power in Maharashtra come from these districts. They are related directly or indirectly in the production of these cash crops. Even if they are not involved in any way, the ones who are involved are the ones who have brought them to power and are keeping them there. So the present system is protecting the people who are in power and/or their benefactors. And no person who is in power will pass a law against their own interests. This is the political economy of this power sector which seems to became the center point of all the difficulties that is mainly damaging the electricity sector of Maharashtra.[4]

VII. ENERGY AUDIT CUM STUDY SURVEY

In the guidance of CTARA Group, energy audit cum study survey was carried out. Its main intension was to examine agricultural electricity consumption in Maharashtra. The greater goal of this effort was to end the ambiguity in the unmetered agricultural consumption figure. This project aims to find a reliable and efficient methodology to determine

Agricultural consumption. Efficient metering and clarity in supply to agriculture will lead to better health of the distribution utility and hence better supply to rural consumers.

This study could be used in other states since the same issues exist everywhere

A. Methodology

In this study we have to-

- 1) Find electricity usage for various crops
- 2) Check the data on the Field level- for e.g. power consumption as recorded and actual power consumption

- 3) Check energy outflow on feeders
- 4) Check status of metering on the ground

From the data collected we have to-

- 1) Compare ideal crop-water requirements to real usage
- 2) Analyze the pattern of connected load as per MSEDCL records to actual loads

- 3) Analyze the dependence of the above two results to the energy outflow on the feeder

- 4) Estimate variation in water usage across consumers on a DT / on a feeder / across divisions / zones

And from the data collected and cropping pattern across Maharashtra- extrapolate the consumption across the state. Also find a methodology that can be repeated each year

B. Scope

In this way Energy audit on a 100 feeders across 10 zones all over the Maharashtra is carried out in the month of March 2016. Among them 15 Detailed audits and 85 High level audits was carried out .80 consumers per Detailed Audit and 12 consumers per High level Audit was studied under the survey.

VIII. DATA ANALYSIS

Here the data analysis of the survey reports is presented. The Manora AG Feeder of the Washim circle of Amravati zone is taken here for instance.

A. Metered & unmetered consumer

The survey carried over the Manora AG Feeder shows noting outcomes. The first outcomes of the survey reports is surprising to present that unmetered consumer was 93 % which is very much greater than the metered one which is 07%. Means the almost consumers are not having the meters also. They are billing on HP basis.

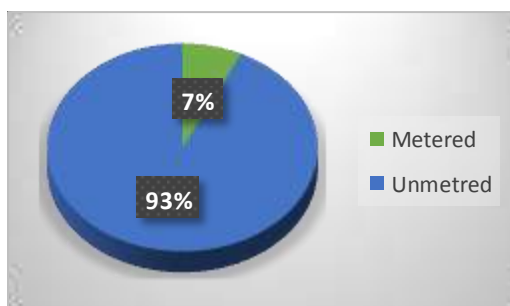


Fig. 1 Metered and unmetered consumers.

B. Meter status

The second outcome from the survey report shows another surprising outcome i.e. whatever the metered consumers are there, among them only 67 % of meters are in working state and the remaining 33% meters are not in working condition. Means the meters which are connected are very much less at first and which are connected among them many are not working.

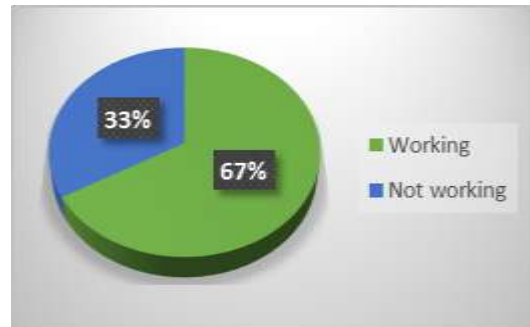


Fig. 2 Meter Status

C. Crop Data

In this region usually soyabean is the popular crop taken in the month of June to November. Many farmers take a combination of two crops. Soyabean and Tur is popular combination in this sequence. here many others crops are also seen. The soyabean is planted in big proportion of 46% and the combination of soya with Tur is also seen upto 26%. Cotton and tur is taken at very low percentage of 3%. Many other crops in very low proportion are taken. Such crops include chilli, papaya, Mossambi, orange and ground Nuts. All of them are taken individually with very much low percentage summing them all constitute 25% of the total crop percentage.

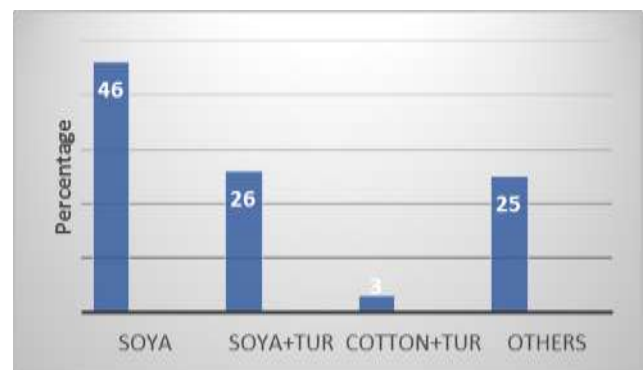


Fig. 3 Percentage of crop taken in the month from June to November.

D. Daily Pump Usage

The survey report also focused on the pump usage per day of the consumer. About 40% consumers uses pump for 1-2 hours daily. And 39% consumers uses pump for 2-4 hours daily. Only 14% consumers used 4-6 hours daily. Above 6 hours pump usage is found at very low 7 %. The water is available in moderate proportion in this region.

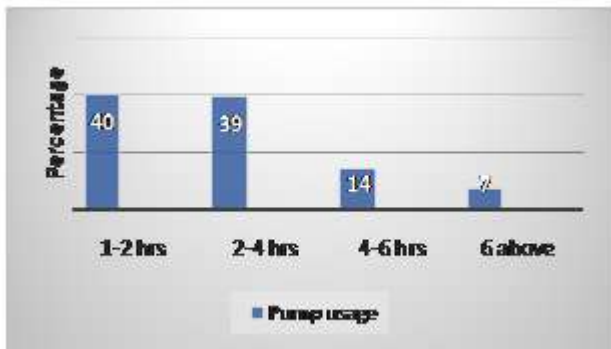


Fig. 4 Percentage of Daily pump usage in hours

E. HP rating of the motors.

There is typical variation in the HP rating of the consumer of this region. Among all the consumers 54% consumers uses the motors of 5HP and the 39% of them uses the motors of 3HP rating. And the remaining 7% consumers uses the motors of 7HP. Fig. 5 shows this information diagrammatically.

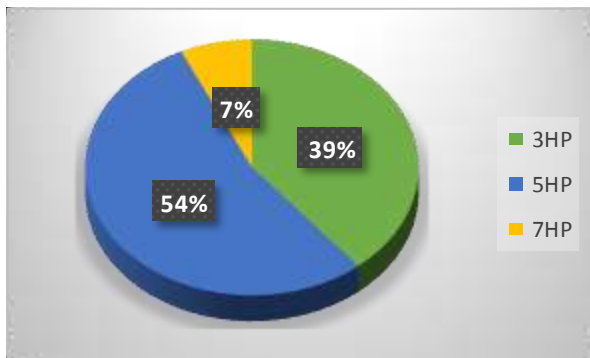


Fig.2 HP rating of the motors used by the consumer

IX. THE PROBLEM

In the focus of the the prior discussion and the data analysis of the survey report let us try to analyse that though the MSEB is the is the second largest electricity distribution utility in the world and stands first in the India, the state had a deficit of about 3,000 MW. This condition is tending to be worst rather than improving. Some of the problems faced by the MSEB presently for their own development are discussed here.

1. Depressed financial situation of MSEDCL

The total outstanding payments due to MSEDCL are apparently close to Rs.30,000 crores! That's mind-boggling to say the least. And unless MSEDCL recovers these dues, their financial situation will remain in the doldrums.

2. State is in a financial mess

Maharashtra state is in a big financial mess as well; the outstanding debt of the State is supposedly close to Rs.3 lakh crores! And therefore, out of every Rupee that the State earns, only 14 paise is available for development projects. This is a sad state of affairs and something that constrains the present government severely in developing the electricity sector. Therefore, it is a big problem.

3. Adoption of Renewable energy sources which are more expensive

Renewable energy sources are expensive as compared to conventional energy sources, and cannot be adopted unless the electricity sector is healthy. However, if MSEDCL has Rs.30,000 crores of outstanding dues and if that amount is increasing with every passing day, is it feasible for them to buy more expensive renewable energy?

X PROPOSED SOLUTION

The present situation of the power consumption in Maharashtra is briefly discussed above. Now if anyone compare the statistical reports of the above discussion and the data analysis of the survey cum energy audit then very easily he comes to some common conclusions that the agricultural loads impart not only to the power quality but also on the total financial condition of the MSEDCL. As discussed above Maharashtra have the highest generating capacity in India & then also in spite of providing the power to the other states ,the state itself is in deficit of power and in many part of the state load shading is going on to compensate the deficiency. Power deficit in Maharashtra is not only resulting of the increasing demand but mismanagement is also contributed to it a lot. Analyzing the above discussion there are some proposed solutions for this problem in perspective of the agricultural load

A. Improve financial situation of MSEDCL

An improvement in the financial situation of the MSEDCL is important not just for the sake of MSEDCL alone but for the health of the entire sector. If MSEDCL's financial health improves, then the health of all the others in the chain will improve: Mahagenco ,Mahatransco, the IPPs (Independent Power Producers), and the banks – Public Sector Unit (PSU) banks as well as private banks. If the energy sector becomes vibrant and if industries get reliable electricity at affordable rates, then industries can stop worrying about power cuts and rising bills and focus on their core competencies, which will contribute hugely towards improving the state's financial health. There are some steps to improve the financial situation of te MSEDCL.

1. Make all the agricultural connections metered strictly. As per the survey report, if most of the consumers are not metered and whoever are metered but the meters are not in working conditions. Unless the meters are not there how can we have the proper billing? MSEDCL has shown a progressive reduction in Aggregate Technical & Commercial losses over the years, but the reduction is not real. If they are not even measuring the electricity consumed at all the end points, how do they know what their losses are? And if the reduction was real, why is MSEDCL in doldrums?
2. Check the correct HP rating of the consumers as it ultimately contributes to the total power quality. Because many times it is founded that the farmers are not registering the correct HP rating of the motors.
3. Supply the power to the agricultural consumer knowing what crops are they taking and for how

much time they need it? Should electricity be subsidized for farmers growing *all* types of crops? Or should some crops be removed from the list? The chief Minister has said a few things to this effect already, and has also talked about banning sugarcane cultivation in the water-scarce Marathwada region. He has also begun talking about treating water like a scarce and economic resource and hiking water tariffs

4. No doubt farmers need to be provided with electricity at subsidized rates, and this has to be done not just for a few farmers but *all* farmers. Similarly, it is okay to subsidize electricity for certain weaker sections of the society. However, whatever subsidies are given, they need to give explicitly.

B. Adoption of smart grid and smart meter technology.

Smart meters are, as their name suggests, meters that are smart and do two things that simple meters don't do:

1. ToD (Time-of-Day) metering : This is very important since it tells us how much people are consuming and more importantly when.

2. Communication: In the simplest case, the communication is one way: from the meters to the control room. If all the meters communicate their consumption to the control room say every fifteen minutes, then it will give an accurate picture of the consumption patterns. The more advanced scenario is when the control room can also communicate with the smart meters and tell them to do something. And that something is increasing or decreasing the load to match the generation.

C. Adopt the energy efficiency measures

MSEDCL should take the initiative and replace all old agricultural pumps with ones that have the latest and greatest technology. Depending on how bad the old pumps are, it could save anywhere from 10% to 30% energy. Even if we go with an average of 20% savings, it could save 5% of the total electricity consumed by Maharashtra.

D. Adopt net metering policy.

Introducing a good net metering policy is the key to encouraging renewable energy sources. All renewable energy sources, with only a few exceptions, are "variable"; they are called "infirm" in technical jargon. They also have other constraints. Almost all the renewable energy sources, therefore are connected to the grid. But with the conventional metering, many of them are getting penalty in billing in spite of the

incentives. With the net metering, all the generated energy is pushed into the grid. Of course, if there are local loads, they will draw energy from the grid. At the end of every month, you measure the "net" energy consumed. If it is positive, you pay to the utility company. If it is negative, the utility company pays you, or carries it forward and adjusts it against next month's bill.

XI. CONCLUSION

To be proud of being the second largest electricity distribution utility in the world and to develop this proud with the prosperity of domestic, industrial as well as agricultural field of the state, it is very essential to take care of the MSEDCL. And the noteworthy part of the MSEDCL consumer is "agricultural load" which is having considerable impact not only on the power quality factor but also on the financial situation of the MSEDCL. This means that for the development of the state whether it is technically or financially, the agricultural load need to be inspect, maintain and improve up to the best of our effort. The solutions suggested here are strongly based on the Manora survey reports and the data published by the government authority. Hence are realistic and not imaginary. Therefore if implemented certainly will results in the welfare of the power sector of the state which finally will results into prosperity of the state and simultaneously of the nation.

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