



Insights from ESMI

Electricity Supply Quality in the state of Uttar Pradesh
January-March 2018



Uttar Pradesh is India's most populous state and has almost 13 million households that are yet to be electrified¹, but this number is fast reducing, all credits to the Saubhagya Scheme undertaken by the Government of India. Even with number of electricity connections increasing, electricity supply quality in the state has always been a matter of concern, with limited hours of supply and frequent blackouts, and voltage fluctuations. In the FY 2017-18, the peak demand in the state exceeded supply by 10.9% as reported by CEA, where the national average is at 2%². Although having electricity connection is important, of those who do have an electricity connection, many receive poor quality service. The next step in bettering electricity access in the state is to provide for reliable electricity supply.

Electricity Supply Monitoring Initiative (ESMI) is a program being implemented by Prayas (Energy Group). It aims to improve transparency and provide evidence based feedback about the quality of electricity supply. Under ESMI, specially designed, mobile data enabled monitors are being deployed at each location and supply quality data is published daily at watchyourpower.org. ESMI was selected as a finalist for Google Impact Challenge, India, 2013, given to NGOs using technology for social impact. It was launched in March 2015 and currently covers over 50 districts across India.

This report is aimed at documenting current state of supply and to provide feedback to planners, regulatory commissions, and distribution utilities, with the aim of facilitating improvements in supply quality and supplementing their efforts to improve quality. The report is an aggregation of power quality data received from four districts in Uttar Pradesh over the quarter

Jan- Feb- March 2018 at ESMI locations. The report covers a total of 64 locations which include 34 rural and 30 urban locations. The analysis presented here is based on power quality including voltage fluctuations and interruptions represented through daily patterns. A series of graphs have been used in the report to illustrate the observations derived from the analysis.

Electricity supply quality in Uttar Pradesh (Jan-March 2018)

		Jhansi	Barabanki	Sitapur	Bahraich
Daily supply hours	Urban	22	18	19	20
	Rural	18	17	14	15
Evening supply hours (5-11 pm)	Urban	5	4	4	4
	Rural	4	4	3	3
Interruptions in a month	Urban	32	75	76	59
	Rural	101	78	116	121
Outage hours in a month	Urban	34	151	137	99
	Rural	147	196	283	246

The Uttar Pradesh State government has committed 24X7 quality, reliable and affordable power supply for all, by 2019⁴. As the figures in the table on the left indicate, significant effort needs to be made to improve distribution systems to achieve the goal. The electricity supply situation is notably better in some urban areas than rural areas in all of the state.

Sources

1. Saubhagya dashboard, visited on July 22nd 2018
2. Executive Summary-March 2018, Central Electricity Authority
3. Census of India 2011
4. 24X7 Power for All Uttar Pradesh, Govt. of Uttar Pradesh, Govt. of India
5. UPERC, Supply code 2005

Notes

- Analysis in this report covers locations with more than 90% data availability during the months.
- Urban areas are district headquarters and other municipal areas.
- Rural areas are those governed by *Gram Panchayats*.
- Analyses, except evening hours of supply, consider interruptions longer than 15 minutes.

District profiles This section of the report presents observations about power supply quality at the district level as recorded by ESMI. The analysis includes data recorded from four districts where ESMI has a significant coverage namely Jhansi, Barabanki,

Bahraich, and Sitapur. The analysis presents the supply quality at the urban and rural level in each of these districts. Some peculiar case examples are also discussed in this section, from ESMI locations in the respective districts.

District Barabanki is situated to the north east of Lucknow. The district has a population of 3.3 million³. 56% of the total 7.1 Lakh households have been electrified¹. This report covers data from 18 ESMI locations in the district.

Barabanki town is just 30 km from Lucknow, the state capital, but as the below data indicates, the supply quality is not much different than other places which are relatively far away from State Capital.



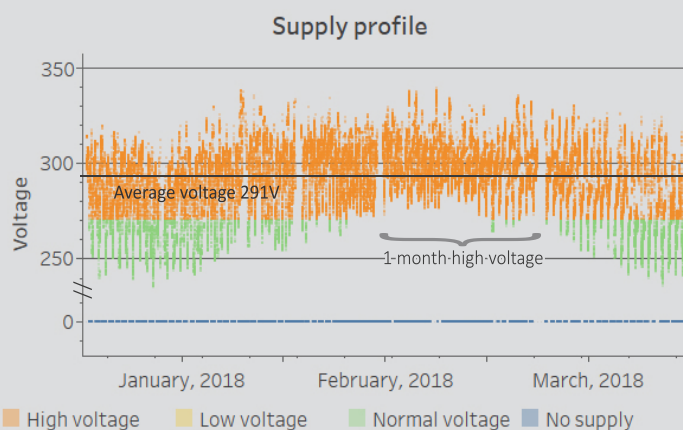
The urban as well as rural locations get only about 17-18 hours of electricity supply daily. We also observed that all locations in the district received only 4 hours of electricity supply during evening hours.

Interestingly, the average number of supply interruptions in both rural and urban locations also remained the same between 2 to 3 every day.

Village Baraulia, with a population 2745³, is located about 40 km to North-East of Barabanki town, the District Headquarter. Out of the 494 households in the village, 258 remain to be electrified¹. Observations show that the village regularly receives high voltage supply (greater than 270 Volts), often remaining consistently high for over 12 hours in the day or longer

on certain occasions. The voltage profile chart shows that between February 8th and March 10th 2018, the voltage supply at Baraulia when available, was almost always significantly higher than standard prescribed by the regulatory commission i.e. 255 V⁵.

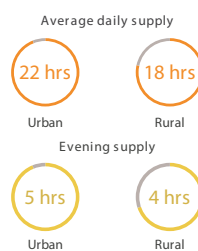
The average voltage of electricity supply between January and March 2018, was observed to be 291V.



Several instance of voltage crossing over 300V have also been recorded for around 8 hours in a day on an average. At the same time Baraulia also witnesses power outages averaging more than 5 hours a day spread over two or more interruptions daily.

District Jhansi, located in the south west of Uttar Pradesh, about 350 km from Lucknow, has a population of about 2 million³. Out of the 3.7 lakh households in district Jhansi, about 50% are electrified¹. ESMI has collected data from 6 locations in the district of Jhansi, for the period presented in the report.

The urban locations reported on an average 22 hours of electricity supply every day, whereas rural locations reported 18. During evening hours, between 5 &



11pm, urban locations received supply for 5 hours out of 6, and rural only for 4. The urban locations in the district of Jhansi experienced at least 1 power supply interruption a day on

an average, lasting for about two hours, whereas the rural locations experienced 3 to 4 interruptions per day on an average between one and three hours each.

District Sitapur is in Central Uttar Pradesh, north of Lucknow district. Sitapur town is about 90 km from Lucknow. The district has a population of 4.5 million³. 63% or 4 Lakh out of the total 6.4 lakh households in the district are electrified¹. ESMI reports data from 19 locations in the district.

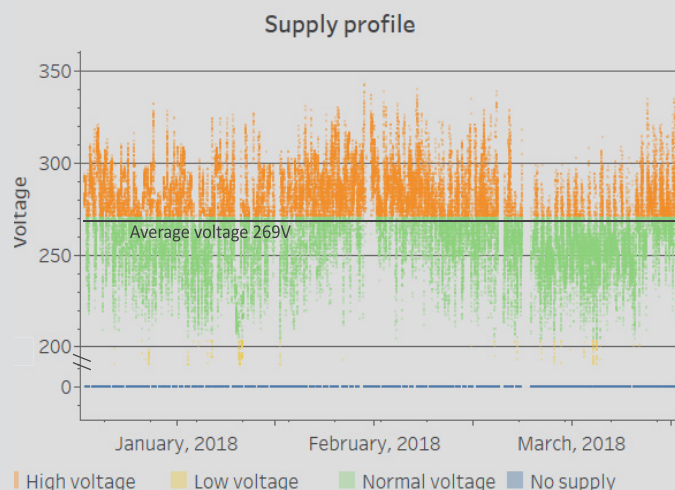


In Sitapur, urban locations received about 19 hours of supply a day on an average, while the rural locations received only 14. During 6 hours in the evening, between 5 to 11 pm, the urban

locations received supply for 4 hours, and the rural locations only for 3 hours per day. The urban locations reported at least 2 power supply interruptions, and rural locations more than 3 every day.

Village Sikandarabad is about 50km from Sitapur, the district headquarters. As can be seen from the voltage profile, villagers in Sikandarabad experience high voltage (> 270 V) supply for about 4 and 9 hours on a given day. Voltage has been recorded close to 350V on multiple occasions and supply over 300V is a very usual occurrence. The occurrence of high voltage is typically seen between evening and early mornings. However, the chart also shows that these occurrences have reduced since the beginning of March which may be due to increase in load, or improvements in

the distribution system.



In addition to long hours of high voltage, the location also suffers from multiple power supply interruptions, 3 to 4 everyday, adding up to 6 hours or more of power outage. Outages between 15 minutes and one hour account for the most of the power outage in Sikanderabad.

Such erratic supply has been reported to have caused significant damage to electrical equipment in the village. In November 2017, voltage shot upwards of 300V and stayed so for more than 30 min. The anecdotal evidence indicated that almost every household in the village, reported damaged appliances such as tube lights, bulbs, fans, and television sets. One of our ESMI supply monitors was also damaged in a similar episode.

District Bahraich is in north central Uttar Pradesh, bordering Nepal. Bahraich Town is about 120 km from Lucknow, the state capital. The district has a population close to 3.5 million³, and 3 lakh households out of the total 5.6 lakh i.e. 54%, are electrified¹. Here we present data for 21 ESMI locations in the district.

The urban locations in Bahraich get about 20 hours of electricity supply per day. This number reduces to 15 in case of rural locations. Urban locations get only

4 hours of electricity supply in the evening hours while rural locations get about 3. The number of interruptions and duration of interruptions follow the same trend. Urban locations in the district experienced 2 to 3 power supply interruptions each lasting about an hour and the rural locations have 3 to 4 of them in a day leading to more than 8 hours of outage.

