

Electricity Supply Monitoring Initiative (ESMI)
Prayas (Energy Group) Pune, India

Electricity consumers in India as well as in many other developing countries often suffer from poor quality of electricity supply. Continuity of supply and reasonable voltage levels are two most important aspects for the consumers. Frequent interruptions, load shedding / blackouts and low voltage levels force consumers to either invest heavily in alternate supply sources and protection equipment or suffer from loss of productivity and inconvenience. Also utilities attempt to justify large capital expenditure and the associated tariff increase by citing the goal of improvement in supply quality. Hence effective monitoring of supply quality is essential. To quantify reliability of supply, authorities (e.g. governments, regulatory commissions) often use reliability indices, such as CAIDI, SAIDI and SAIFI, developed by IEEE, USA¹. These complex indices require extensive measurements and their calculation and reporting are today at an evolutionary stage in India. For example, though the Maharashtra Electricity Regulatory Commission (MERC) requires utilities to publish these indices every month, as per the definition adopted by MERC, planned / scheduled supply interruptions (including load shedding) are not considered while calculating these indices. Central Electricity Authority also compiles and publishes data about interruptions on 11 kV feeders. But this compilation only covers urban area (i.e. cities and towns with populations above 0.8 million) and data about supply interruptions in rural areas is not compiled. Most of these data is manually recorded at the utility substation and there is no independent monitoring or validation of the same. Thus, though recently efforts are being made for capturing supply quality parameters, there is still a long way to go for reliable and comprehensive indicators of supply quality.

The Electricity Supply Monitoring Initiative (ESMI), by Prayas, is developed as a compliment to such ongoing efforts to monitor electricity supply quality. It is an attempt to develop a tool

¹ Customer Average Interruption Duration Index (CAIDI) – This index measures the average duration of interruption for those consumers who experience interruptions during the reporting period.

System Average Interruption Duration Index (SAIDI) – This index shows the average duration of interruptions for all consumers (i.e. including those who did not experience any interruption) in the reporting period

System Average Interruption Frequency Index (SAIFI) – This index shows the average frequency (number) of interruptions per consumer during the reporting period.

for consumers and regulators to get an idea of the ground reality and to increase the accountability of electricity utilities. For the first time in India, ESMI captures supply interruptions data as well as voltage levels at the ordinary consumer location.

About Electricity Supply Monitoring Initiative (ESMI):

A key component of the ESMI is a data logger developed on the basis of conceptualisation and specification by PEG. This data logger records supply voltage at every minute as well as timing and duration of all supply interruptions. Data could be stored for up to one month and is downloaded and analyzed on a personal computer. Such data loggers could be installed at different locations within a division / area of the utility to capture representative performance. Annexure 1 shows the typical analysis of interruptions and voltage levels, using ESMI data loggers.

The objective of ESMI is to empower consumers to monitor electricity supply quality in their area, village or town. Based on data collected through ESMI data logger consumers can gather concrete data about supply interruptions and voltage levels. This could be used for a variety of purposes; such as, to :

- Monitor utility's actual performance as compared to the 'standards of performance' (SoP) prescribed by the Regulatory Commission for supply quality
- Monitor if load shedding / planned outage is being carried out as declared / as per the regulatory commission's directive
- Monitor if there is improvement in supply quality as claimed by utility after making significant capital expenditure in a particular area
- Compare supply quality in different localities (e.g. urban v/s rural, rich v/s poor neighborhood)
- Help understand causes of interruptions (e.g. local network problems, supply shortage)
- Identify the likely problem in distribution network leading to problematic voltage profile

- Develop typical voltage profiles at consumer end, which are useful for designing different electrical equipments and household gadgets.

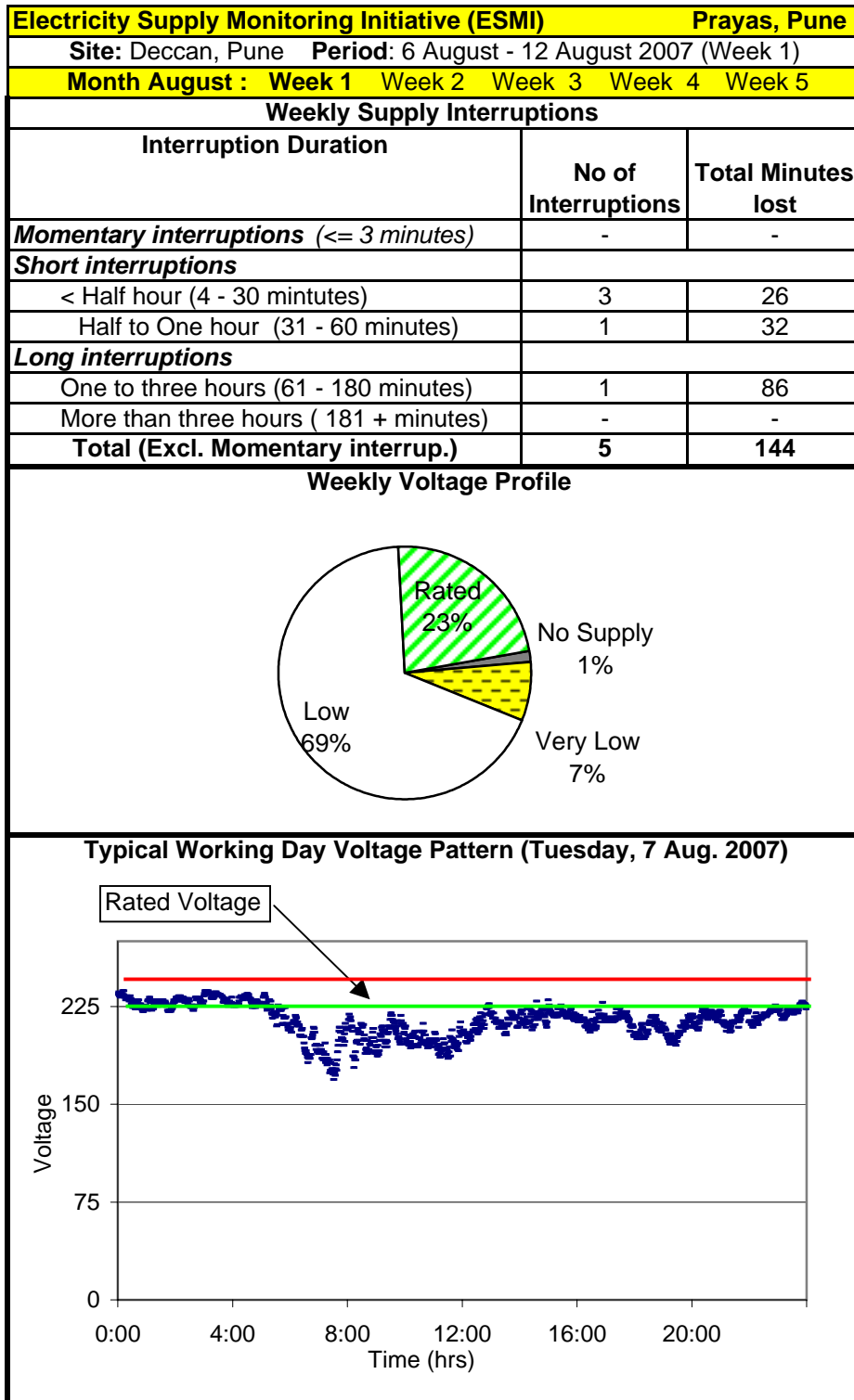
Initially PEG has installed three such data loggers in Pune City, electricity to which is supplied by Maharashtra State Electricity Distribution Company Ltd. (MSEDCL). Data for supply voltage and interruptions from these locations will be periodically downloaded and published at <http://prayas.icantrack.com> . Number of locations where data loggers are installed will be increased in coming weeks to cover more areas.

To know more about ESMI or to join ESMI, please visit www.prayaspune.org/peg or write to peg.esmi@prayaspune.org

We thank Mr. Siddharth Malani and Identysol for their support and generous concession, which enabled sharing of ESMI data through 'icantrack'. (www.identysol.com)

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Annexure 1



Notes:

1. First Table shows the number of interruptions classified according to the duration (i.e. minutes of interruption)
2. Pie-chart shows the weekly voltage profile - i.e. % of time the voltage (V) was in a particular range
 (Very low : Voltage < 196 V ; Low : 196 V \leq Voltage < 225 V ;
 Rated : 225 V \leq Voltage < 255 V ; High : Voltage ≥ 255 V)
3. Last graph shows the voltage profile on a typical day. Rated / Desired Voltage range is 225 V \leq Voltage < 255 V