



Premature Breakdown

Impact of distribution asset failure on consumer tariffs in Rajasthan

By Manas Kundu, Director (Energy Solutions), ICAI; and Balawant Joshi, Managing Director, Idam Infra Advisory

The distribution system is the backbone of the power sector, helping deliver quality supply. In India, it is also the weakest link in the delivery of electricity to citizens. Due to lower-than-cost tariffs and non-receipt of mandated subsidy from the government in time, the financial health of the public distribution utilities is precarious. According to the latest reports, distribution companies collectively owe more than Rs 1.5 trillion to generating companies in India. Further, utilities are facing problems such as high network losses and low power supply quality due to several reasons, including absence of an asset management philosophy, power theft, poor industrial relations, and erratic supply causing surges.

Distribution utilities in India have a high transformer failure rate in the range of 12-17 per cent as compared to the low failure rate of 1-2 per cent experienced by well-run utilities in developed countries as well as our own private utilities. A high asset failure rate and low quality of supply create a sense of perennial mistrust between utilities and customers. In the face of demanding consumers, repeated failures and downtime also increase operations and maintenance costs. This, in turn, increases electricity tariffs for consumers.

In the distribution network, the most essential element is the distribution transformer (DT), which is a capital-intensive element. DTs are facing a high failure rate as compared to other key assets of the distribution system. Their failure leads to:

- Failure of the distribution system
- Revenue loss due to downtime
- Financial loss in repair and replacement
- Failure in meeting reliability indices

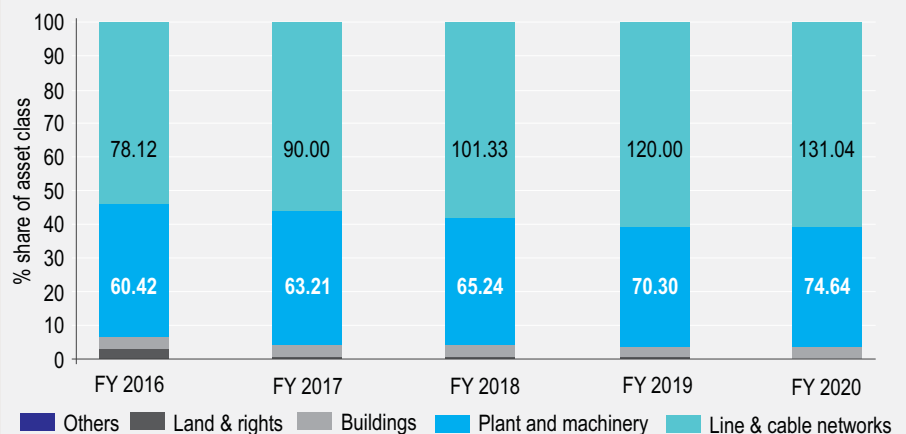


related to benchmarking quality supply to consumers.

It is obvious that the frequent failure of such capital-intensive assets at the distribution level will have significant cost implications for the overall annual revenue requirement (ARR) of any utility.

The Electricity Act, 2003, emphasises the need to provide reliable and affordable electricity to all consumers. If consumer tariff increases have to be kept at a minimum, it is necessary to minimise the costs associated with the failure of these

Graph 1: Year-wise break-up of GFA in JVVNL (Rs billion)



Note: The data labels on the graph depict GFA (in Rs billion) for the particular asset class.

assets. With this perspective, the International Copper Association (India), a leading not-for-profit organisation promoting sustainable development worldwide, entrusted Idam Infrastructure Advisory Pvt. Limited (Idam Infra) with analysing the distribution asset failure rate and its impact on consumer tariffs of a chosen utility.

Scope of the study

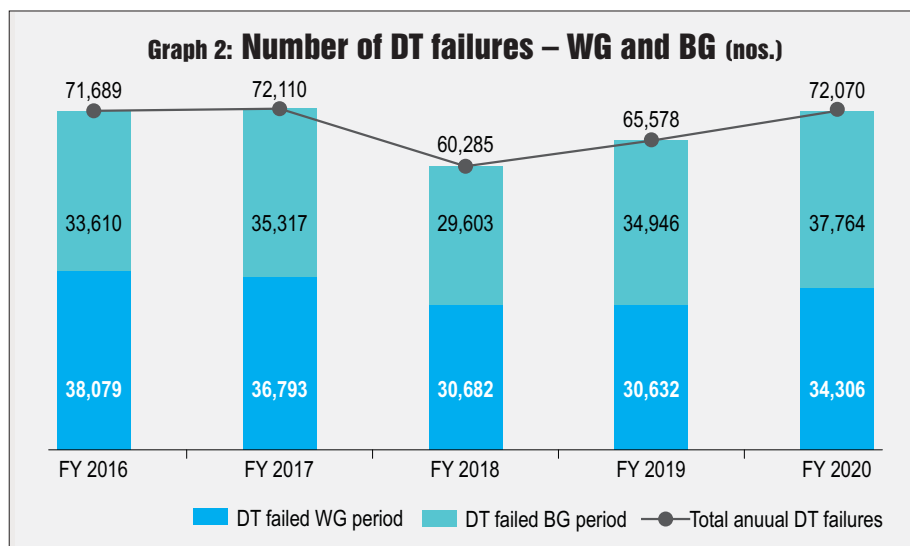
On obtaining consent from the management, a detailed study of DT failure and its impact on the tariff was carried out for Jaipur Vidyut Vitran Nigam Limited (JVVNL), the public utility serving Jaipur and adjoining areas in Rajasthan, India. It was observed that plants and machinery, and lines and cables comprise a major portion of the gross fixed assets (GFAs). Further, JVVNL has been undertaking a capex of Rs 18.36 billion per year, resulting in total GFA of Rs 214.53 billion in 2019-20.

The DT failure rates were in the range of 9-11 per cent each year between 2015-16 and 2019-20 as shown in Graph 2. Further, the number of DT failures in within guarantee (WG) and beyond guarantee (BG) periods was in the ratio of approximately 50:50.

It was observed that out of a total of approximately 700,000 DTs in JVVNL in 2019-20, around 70,000 DTs failed, recording a high failure rate of 10 per cent. Since JVVNL's major services are in the semi-urban and rural areas, the above failures are mainly attributed to the overloading of DTs connected to the rural feeders. Manufacturing defects – poor insulation, loose connections, inadequate periodic maintenance leading to oil leakage, unbalanced load, etc. – are the other major reasons for failures in the WG and BG periods. Although the cost implications of DT failures in the WG period are zero, failures at such a high level are alarming.

Key findings

- DTs failures in the BG period are the ones creating capital cost implications for utilities, as 90 per cent of the DTs



are replaced.

- JVVNL's distribution/wheeling cost constituted around 28 per cent of the ARR in financial year 2020, highlighting the need for optimisation.
- Asset-related direct costs (depreciation, interest on loan, and repairs and maintenance) stood at Rs 1.48 per unit in financial year 2020.
- The absolute impact of DT failures in 2019-20 for JVVNL is estimated at Rs 1.76 billion.
- The financial impact of DT failures as a percentage of asset ARR of JVVNL was as high as 5 per cent in 2019-20.
- The per unit impact of DT failures was 7 paise as against Rs 1.48 total asset-related per unit cost.
- At present, JVVNL does not claim return on equity (RoE). However, in a scenario where RoE must be deployed for such capex, the RoE required to be deployed can be reduced, resulting in potential savings for JVVNL.
- In addition, it was assessed that JVVNL lost revenue of Rs 168 million in 2019-20 due to time lost in repair/replacement of transformers.

Key takeaways

Reduction in the transformer failure of a utility can help in the optimisation of capital expenditure and operational expenditure. Further, a reduction in asset failure is important to reduce the overall downtime of interruption for improving the reliability of the distribution system

and delivering quality electricity supply service. The following are some recommendations from this study:

Utility perspective

- Each discom should be mandated to quantify the impact of asset failure on ARR in terms of all types of assets, and conduct periodic monitoring and review.
- Discoms should investigate the primary reasons for the high failure rate of DTs and strengthen asset management practices in the areas of vendor selection, procurement, inventory management, scrap disposal, etc.
- An online DT monitoring system should be adopted to monitor the performance of DTs and to initiate timely preventive maintenance. Regulators may mandate discoms to quantify the impact of asset failure.

Regulators' perspective

- Regulators may direct utilities to factor in savings for maintenance of failure rates at benchmarks set by the commission.
- Strengthening asset management and R&M practices will lead to better performance of the utility. This will result in strict compliance with the standard operating practices set for the utility. The regulators may consider revising the norms to encourage the efficiency of utilities and the consumer will be the ultimate beneficiary. ■