

GIS for Effective Energy Auditing



Center for Study of Science, Technology and Policy

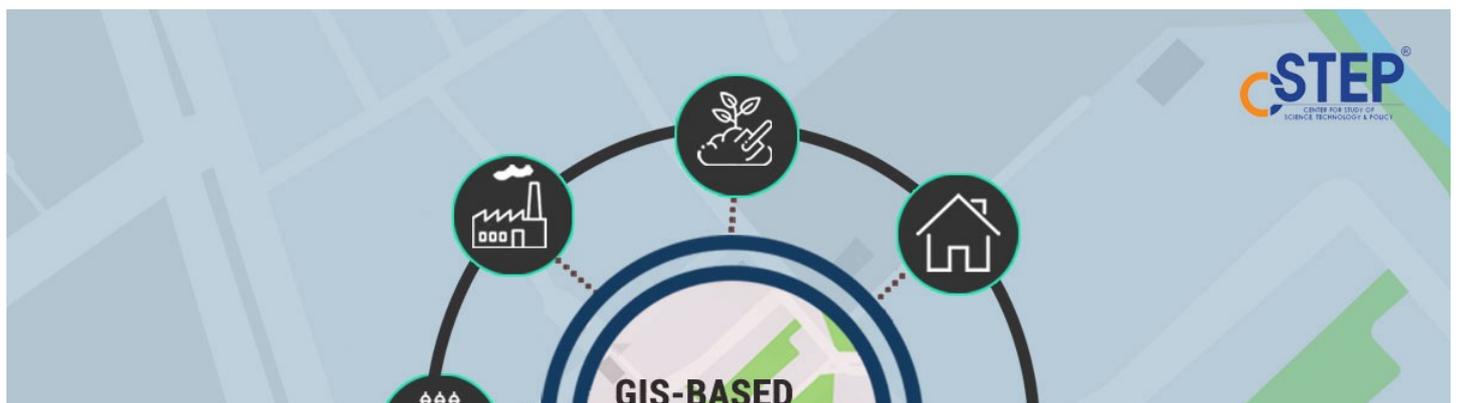
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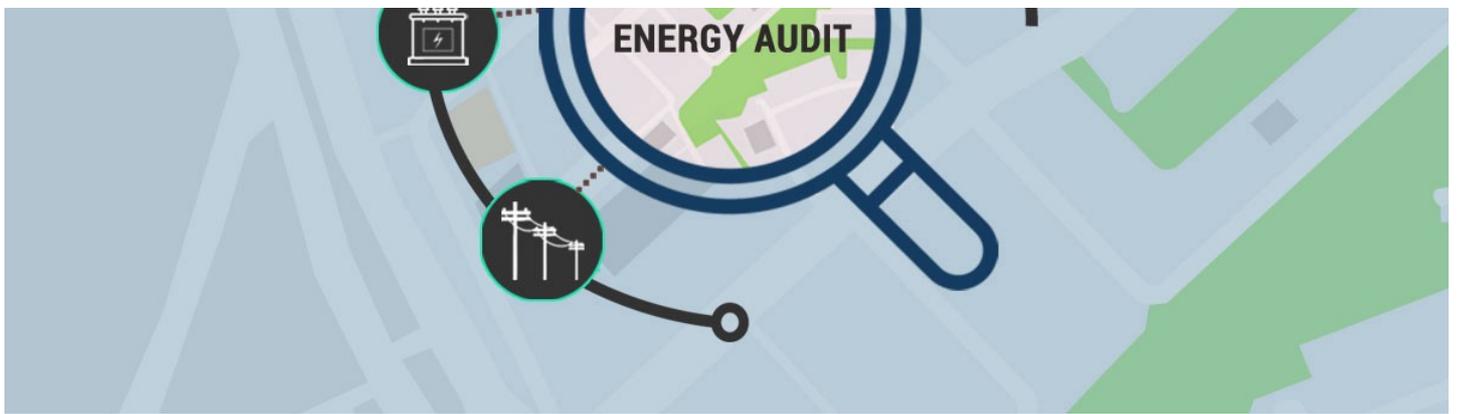
By Mallik EV, Rishu Garg & Hanumanth Raju GV.

The COVID-19 pandemic has affected the revenue of electricity distribution companies (DISCOMs), thanks to the shutdown of industrial and commercial establishments, and difficulties in billing and collection. Due to the lockdown, DISCOMs could not bill consumers accurately, as meter readers were not able to visit the field to record electricity consumption. Moreover, revenue collection has been impacted as consumers are not able to make over-the-counter payments. These issues are likely to aggravate DISCOMs' aggregate technical and commercial (AT&C) losses.

Technical and commercial losses have been affecting the financial sustainability of DISCOMs for years. Technical losses occur due to loss of energy during transmission of electricity from grid to consumers; on the other hand, commercial losses occur due to manual errors such as inaccurate billing, defective metering, low collection, theft and pilferage, etc. High AT&C losses mean that DISCOMs are spending more for supplying the same amount of energy to consumers with lower revenue recovery. This, in turn, implies that DISCOMs cannot spend more on building robust infrastructure, which in turn aggravates AT&C losses.

Thus, to reduce AT&C losses, DISCOMs need to address both the issue of billing & collection efficiency as well as infrastructure. This will improve the quality of service provided to consumers.





GIS can play a significant role in addressing the data gaps in the current energy auditing processes followed by DISCOMs

One way to improve billing and collection efficiency is through putting technology-enabled energy auditing in place. Energy auditing helps identify points where losses are occurring in the distribution system, allowing DISCOMs to introduce checks and balances to curb these losses. DISCOMs conduct energy auditing by comparing the energy input at the feeder end with the energy consumed at the consumer end. However, this process misses out discrepancies, such as when a consumer does not have a meter or when the meter is connected to a different feeder. This lack of accurate data can result in miscalculation and wrong attribution of losses. This is where the Geographical Information System (GIS) comes in.

GIS can play a significant role in addressing the data gaps in the current energy auditing processes followed by DISCOMs. GIS locates the coordinates of the feeders, transformers and consumers and helps in mapping the entire distribution system. Such a system would help DISCOMs track and manage their assets. Visualising this information will also enable accurate ‘tagging’ of consumers to their respective feeders and transformers — known as consumer indexing.

In addition, often, transformers are shifted from one feeder to another due to maintenance issues, overloading and cable faults. Currently, there is no mechanism in place to update the number of transformers shifted to another feeder. This results in inaccurate energy auditing due to a mismatch in consumer indexing. The GIS platform would provide a schematic of the distribution network, incorporating such instances of shifting of the transformers, thus enabling a robust auditing process.

GIS could also help DISCOMs in ensuring accurate billing and collection. Currently, DISCOMs bill each consumer on a monthly basis. The meter reader (MR) visits the consumer to record the meter reading and generate the bill. This billing process is susceptible to errors such as incorrect meter readings. Often, MRs generate bills on

estimation, without visiting the installation. By using GIS, DISCOMs can review this process to ensure that MR's location coordinates match with the consumer meter location, with a +/-5% margin. This would force MRs to physically visit each meter installation to record the readings and avoid 'guesstimate' billing. GIS mapping would also help MRs to locate installations accurately, reducing the chances of missing out on any installation.

In addition, the GIS platform could help in analysing monthly payment trends, monitor and highlight frequent non-payer areas and enable DISCOMs to adopt targeted actions against defaulters. GIS could also play a crucial role in network planning. In areas experiencing demand growth, GIS mapping could enable DISCOMs to take appropriate actions to upgrade or strengthen the network. For instance, when a new apartment complex is constructed, or when increasing aspirations result in increase in electricity demand, DISCOMs can identify the existing transformers and feeders that can handle additional load or plan for upgrading or strengthening the network.

GIS mapping is the first step towards effective energy auditing—crucial for transparency and rigour in the functioning of DISCOMs. GIS technology is a reliable software system to keep track of asset information and consumer data. At CSTEP, we are developing a framework, where the feeders and the transformers are visualised on a GIS platform, to address inherent issues such as improper tagging and ineffective billing of consumers. This would help in monitoring DISCOM assets and improving the value and accuracy of field data, while ensuring efficient and reliable energy auditing. With improvements in energy audits and network planning, GIS can help DISCOMs maintain their systems in a more transparent and efficient manner. The present pandemic offers the right opportunity to incorporate such technology-based scientific methods for daily operations to enable long-term financial sustainability of DISCOMs.

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