Keeping the Lights on in Kolkata

CESC, LTD.
Kolkata, India

CESC Ltd. began generating and distributing power in Kolkata (Calcutta) in 1899, and it's still keeping the lights on today. CESC serves 2.7 million residential customers and 2,000 industrial and commercial users within 567 square kilometers of the twin cities of Kolkata and Howrah, and was the first distribution company in India to implement a GIS.

The company faces special challenges that come with serving a growing city. Once the capital of colonial India, Kolkata is among the most populous cities in the world today. Like many cities, Kolkata has experienced exponential population growth, expanding from 1.5 million residents around the turn of the century to more than 14 million residents as of 2010.

A study from the McKinsey Global Institute identified 23 global megacities – Kolkata among them – that make up 14% of the global gross domestic product and 5% of the world's total population. With access to a densely packed workforce and close proximity to resources, these megacities have outstripped other urban areas in terms of growth. But a city's infrastructure must keep pace with its population for it to continue to be an economic force.

Other megacities such as New York City keep getting taller. Kolkata, however, is growing both vertically and horizontally, as residents flock to the perimeter. These contrasting city profiles are a perfect example of how difficult it can be to continuously map the changing cityscape and provide necessary services.

CESC has risen to the challenge. Since a key growth driver is customer access to clean, reliable power, CESC has been a catalyst for urban development. The company tells its customers, "We guarantee to lighten up your prospects."

"As a power utility, [CESC] would want 100% availability of power at the consumer's doorstep," said Debashis Roy, vice president of IT for CESC.

Despite the demands involved with powering a global megacity, CESC has realized better network planning, reduced down time and loss levels, and increased assistance to field personnel. Overall, it has streamlined operations with the help of utility GIS and network management software from Hexagon's Safety & Infrastructure division.

The Geospatial Foundation

Always at the forefront of innovation, CESC knew GIS and geospatial solutions would help it meet the ever-increasing needs of the community it serves.

"GIS technology has great importance in utility management," said Dipak Kumar Banerjee, IT consultant at CESC. "Data is one thing, and seeing that data in graphical form is another. Managing this data graphically gives a lot of insight to online managers in identifying the ground situation of a particular utility."

With high population density and a complex layout of the distribution network (both underground and overhead), CESC requires very detailed asset mapping. The company divides its territory into 10 districts, and has taken a district-by-district approach toward implementing GIS and newer technologies. It began GIS mapping of industrial/commercial assets in 1990 and implemented Hexagon's early GIS technology two years later.

"We were maintaining hand-drawn maps offline," said Rahul Das, GIS senior engineer at CESC. "When we were ready to switch to GIS, we began our relationship with Intergraph (now Hexagon) in 1992, so we've had a long-term working partnership with them."

In 2007, CESC upgraded to Hexagon's network model management software and migrated its landbase and field assets into the new system. The residential network was surveyed and uploaded in January 2013. This data is now available to end users through Hexagon's customized server product for web-based visualization.

The Hub of Network Operations

The GIS at CESC is integrated with other IT systems for network operations management. All outages and faults are mapped into the GIS by line managers, enabling them to plan and respond to whatever challenges arise.

"There is continuous replication of the data from one site to another so in case of any disaster, the consumers and customers of different departments will not face any problem," said Amit Roy, deputy general manager of IT at CESC.

The GIS also generates reports used by various departments for planning and prevention. Response teams prioritize outage requests and guide field crews through the best routes using GIS. Data collected from consumer calls helps identify repetitive faults. This data helps online managers enhance the network infrastructure wherever necessary.

"Most of the utility companies in India that have switched over to GIS have outsourced the work," Das said. "But we found the Hexagon software to be so easy to use – so user friendly – that we were able to hand it over to our junior engineers and do it all in-house."

CESC's geospatial capabilities have helped the company deal with specific problems, such as weather-related emergencies. CESC operates in an area that receives heavy rainfall (approximately 250 centimeters) during the monsoon season every year. CESC uses the GIS to respond quickly to storm-damaged assets, as all field assets are maintained using the data stored in the GIS. The deployment has also helped CESC reduce electricity theft.

"Many of our residential assets were above ground, and we were experiencing a high level of theft from those assets that had bare conductors," Das recalled. "With the new Hexagon systems in place, we were able to more closely audit energy usage and identify power pilferage."

CESC has also implemented automatic meter reading with approximately 1,500 transformers that assist the technical audit cell while monitoring the health of the district in relation to power outages. These geo-referenced meters provide data to CESC that help determine power theft, as well as load balancing between transformers. With the new system in place, the company cut power loss levels nearly in half, from 23% to 12%, and that number is expected to continue to drop as the system expands.

A Bright Future

Near real-time GIS has gone live in CESC's jurisdiction. Hexagon's solutions are used for identification of faults, route planning, power balancing, and load shedding. By mapping residential assets, the average response time has dropped from four hours to less than one hour, greatly increasing CESC's customer satisfaction index.

Looking forward, CESC is developing multiple applications to improve consumer services. For example, a GIS-based interruption bulletin service for macro-level outages will send text messages with expected restoration times to affected customers.

As Kolkata's long-standing power provider, CESC is not only keeping pace with the city's rapid urbanization, but also leading the race to a more prosperous future for the citizens of one of the world's great megacities.