NPMU LEVERAGING GIS FOR
POWER DISTRIBUTION

India has one of the most diversified power sectors in the world comprising of conventional sources such as coal, hydro and nuclear power and viable non-conventional sources such as wind, solar, etc. Electricity is a prime driver for the economy as well. Over the years, India's electricity demand has increased rapidly. To meet this increased demand, the existence and development of adequate infrastructure is essential. India has moved up to rank 26th in the World Bank's list of electricity accessibility in 2017, still the per capita electricity consumption in our country is far below than the international average per capita consumption.

One of the main goals of the government has been to ensure adequate and quality power supply to customers and increase the reach of the electricity grid to reach all villages and house-holds through the universal electricity supply policy. One of the important policy interventions has been to decrease the T&D losses and increase focus on revenue collection. Smart Grid initiative is one of the methods being adopted to meet the operational requirements of increasing the reliability of the utility networks to ensure reduced T&D losses.

Use of smart grids

A smart grid is the existing network with increased utilization of ICT technologies. Smart grids can help the discoms better manage power generation, transmission and distribution. Using those, they can know better what is happening at what point, which areas are under stress, which are the areas that are not performing, where and when the losses are higher, how it can reduce those losses, etc.

It is realized that power can be delivered in a better manner or understood in a better manner if the distribution companies start measuring what is happening at each node. Because the nodes are spread across the spatial level, it makes all the more sense that we have all the

information on real-time basis in the control center and then take corrective measures.

The problems faced by the traditional networks can be mitigated to a large extent using smart grids. Unlike traditional grids, where power flow is happening only one way, from generation to the load center, in smart grids, the power flow happens on both sides, which makes the grid more productive and intelligent.

Smart grids empower the consumers and ensure quality service to them. They help consumers in monitoring their consumption in real-time. Consumers can know when power-cuts are going to take place. If a customer doesn't want to use power as postpaid, by converting it into a prepaid meter, he can avoid paying when he is travelling. The bill payments are online, so that adds to the convenience. Then a consumer can know what his average consumption pattern is. With smart grids in place, the consumer can produce his own power using solar energy, and can use it at home or sell it. In other words, smart grids enable a consumer to have more control over his power consumption.

From the utility point of view, smart grids help in cutting losses and maximizing revenues by facilitating monitoring of sanction load.

National Smart Grid Mission

Formed in 2015, under the Ministry of Power, the National Smart Grid Mission (NSGM) was approved to develop a smart electrical grid based on state-of-the-art technology in the fields of automation, communication and IT systems that can monitor and control power flows from point of generation to point of consumption. The NSGM is a monitoring body, which not only funds it but also monitors the entire process from deployment to delivery of the smart grid project at ground level. The objective of the

> "With GIS integration, asset mapping has become easy, which allows network planning and better management of distributed generation integration. This means that we can figure out how we can reduce the stress off grid by promoting distributed generation in such areas.
> **Kumud Wadhwa, Deputy General Manager, NPMU**

smart grid is to provide affordable, reliable, uninterrupted power supply 24x7.

The mission is now in its second leg, where it is conceptualizing as to how it is going to roll out Smart Grid projects on the ground level. To ensure a smooth implementation of the NSGM, NSGM Project Management Unit (NPMU) was formed to operationalize the smart grid activities in the country.

GIS in smart grids

The role of GIS in the last few years has increased far too extensively. It has helped many industries in taking better decisions and the power sector is no exception. By integrating GIS with the traditional power distribution network, utility management firms are able to provide enhanced service quality to the customers, by not only enabling quicker detection of faulty lines and faster action, but also achieving better management of assets and outages. Esri ArcGIS platform enables this integration in many cases.

Reliance Energy Limited (REL) is India's leading integrated power utility company in the private sector, serving 25 million customers over 124,300 square kilometers. Along with its affiliates, it has a significant presence in power generation, transmission, and distribution, providing more than 16 billion units of power a year to Maharashtra, Delhi, Orissa, Goa, Andhra Pradesh and Kerala.

The company has a pioneering history of leadership and innovation spanning 75 years in Mumbai providing dependable electricity at competitive prices to its consumers. The company has

941 MW of power generation capacity at plants located in Maharashtra, Andhra Pradesh, Kerala, Karnataka and Goa.

To improve its services related to power generation, transmission, and distribution, REL decided to implement sophisticated applications and upgrade its operations through the use of GIS. After conducting a comprehensive evaluation of GIS software, it decided to implement a GIS-based system on the robust set of software and open information technology (IT) standards capable of integration with other enterprise systems. Esri India is working with REL to ensure that it is able to successfully leverage its geographic data and GIS knowledge across the organisation.

GIS is one of the core applications for the smart utilities. It is implemented in most of the utilities as part of R-APDRP (Revised Accelerated Power Development & Reform Programme) projects. Building on ArcGIS application, utilities have already mapped asset details and consumers. So with that information when smart meters are provided to consumers, the meter level information can be integrated and visualised faster with near real-time alerts and geospatial analysis. Another use of GIS is to support proper network planning. It can be used to figure out the stress assets, release the stress on the grid, when some of the transformers will be overloaded. ◆