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Indian Power Sector & The Smart Cities Project

It has been estimated that the urban population in the country would almost double from 2014 to 2050. The power sector will play a huge role in ensuring that the challenges being presented by India's unprecedented growth are met.

According to the United Nations, India is all set to become the world's most-populous country by 2022, overtaking China. Estimates suggest that about 25-30 people will migrate every minute to major Indian cities from rural areas in search of a better livelihood and an enhanced lifestyle. With increasing urbanization, urban areas are expected to house 40% of India's population by 2030. In order to accommodate this massive urbanization, India needs to find smarter and more efficient ways to manage its resources.

Prime Minister Narendra Modi's pet project, the Smart Cities mission, takes into consideration India's need for efficient and "smart" urbanization. The Smart Cities mission is essentially an urban renewal and retrofitting programme with a mission to develop 100 cities which are citizen friendly and sustainable across the country. It recognizes the fact that cities are engines of growth of the Indian economy with more than 60% contribution to India's GDP. Urban areas are expected to contribute about 75% of India's GDP by 2030 and in order to facilitate the same comprehensive development of physical, institutional, social and economic infrastructure is required.

Smart Cities in India

Even though the government hasn't prescribed any particular model for a smart city, it is expected that the smart cities will include a large number of infrastructure services and smart solutions. In particular, the elements that must form part of a smart city are assured electricity supply with at least 10% of the Smart City's energy requirement coming from solar and smart metering. In the case of redevelopment and Greenfield models of Smart Cities, at least 80% buildings should be energy efficient and green buildings.

Integrating smart grid solutions

Incorporation of the smart grid technology in the smart cities project will offer a unique opportunity to jump into an improved electricity environment and provide reliable 24X7 electricity to consumers. Through smart grids it will be possible to integrate the coal and crude oil generated electricity with the solar and wind. This will reduce fossil fuel use and encourage price drops in renewable technology. Further, current smart grids are also building the technology to integrate consumer-owned energy systems which will benefit customers further – they will not have to pay for the electricity generated by themselves. Smart grids can also monitor loading thus avoiding load shedding and blackouts. Moreover adopting the 'islanding' technique will help ensure that Indian cities get uninterrupted supply of power. Islanding which refers to a condition in which a source continues to get power in a location even when the electricity from the grid is not amenable to being continued due to disturbance in such system, which infact, if allowed to remain connected under such situations, could lead to distribution system itself go-down & sulk/sink along with interconnected grid. So, islanding helps the distribution network bid itself to get absolutely isolated to a harms-away situation from the adjoining grid interconnections. This is used to simulate the said area is an island with no other system existing besides its own elements of Power Generation, Transmission and Distribution, which work in perfect harmony and let the consumer not feel any interruption or change of state, where a lot serious activity is happening in the adjunct systems outside of this island.

Innovations for combating space constraint like pole mounted transformers, natural ester-filled transformers, underground feeder pillars, e-house DSS and using indigenously designed outdoor meter panel box for societies will help setting up the infrastructures where alternative spaces are not available.

Demand Side Management will form an essential part to manage the load. Technologies like Thermal Energy Storage Technology' will in shifting load from peak to off peak hours by using practical, financially viable and proven technologies. With the use of 'Thermal Energy Storage Technology' the central AC plants can run in the night and convert water in the form of ice. During day-time, the AC plants are switched off and building is cooled by the energy stored in the form ice. Thus, air-conditioning is provided during the day-time without actually running the large AC plants.

Smart Infrastructure is another important aspect of the Smart Cities project. Intelligent power networks with the implementation of specialized IT solutions are going to be essential. The Radio frequency (RF) metering is the step towards providing error free bills and eliminating the entry process of a utility person in premises for meter reading. Radio frequency waves are a form of electromagnetic energy that are used for a variety of purposes, like telecommunications. In a word, these are Smart meters that use low-energy radio frequency waves to transmit information across distances. Radio Frequency Meters will enable a step further on providing error free bills and eliminating the entry process of a utility person in premises for meter reading. The data received will used for automated generation of bills ruling out any human intervention.

The players are expected to not only increasingly contribute to the infrastructural advancement but also innovate new technology so as to enrich customer content-

ment and manage their assets effectively. Innovation will be a key to the success of this initiative. One such innovation is the Radio-frequency identification (RFID) technology that will play a critical role in this arena. RFID is a technology wherein there is wireless use of electromagnetic fields to transfer data, for automatic identification and tracking tags attached to objects. RFID is a method for Automatic Identification and capturing of data. The use of the RFID technology will bring in efficiency and thus support power utilities to manage transmission and distribution assets effectively. The technology will help in faster tracking of location and identification of the assets in the field. Even recording the movement of asset from one plant will be easier. Verification process will be faster and all assets can be covered every year accurately with no manual interventions. The real time data can be configured and errors arising out of manual verification process can be eliminated.

In order to make smart cities a reality and to propel India into the future India needs sustainable, reliable and uninterrupted power supply. This means that we as a nation not only need to maximize and increase the efficiency of power generation from traditional sources of power such as coal and oil but also that we need to put a greater focus on developing new and renewable energy. The net metering policy will enable individuals to generate power and feed in to the grid.

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Developing India's capability in the new and renewable energy space is another key requirement to ensure success of the smart cities project. India has immense potential in this area and many efforts have already been initiated by the government for the development of solar energy. India's challenges with harnessing renewable energy are unique. For example, accumulation of dust on solar panels and high per unit cost of energy are some of the challenges the renewable energy industry in India faces. Therefore it is important to increase and incentivize focus on developing indigenous technology and indigenous solutions.

Conclusion

India is witnessing unparalleled transformation from rural to predominantly urban living over the last two decades. From 2001 to 2011, the number of metropolitan cities in India has increased from 35 to 53. At present, these cities account for 43 percent of the urban population in the country. Furthermore, the number of these metropolitan cities is expected to increase to 87 by the year 2031. It has been estimated that the urban population in the country would almost double from 2014 to 2050. The power sector will play a huge role in ensuring that the challenges being presented by India's unprecedented growth are met. The Indian power sector needs to be enabled and empowered so that it can be a propel India's growth and not hinder it ◂◂