

India Grid: Key Challenges & Technology Drivers

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The article highlights the major grid challenges in India and the way ahead for India.



Sustained economic growth and rapid urbanization in India is fueling significant growth in electricity usage and demand. But unlike more developed parts of the world like the

US where the focus is on getting more out of the electric infrastructure that exists, the challenge in India is increasing the availability of electricity. The gap in peak electricity deficit currently hovers around 9-10%.

India's power infrastructure has been through an evolution in recent years, driven by structural policy changes by the government and increased private sector participation in the generation and transmission sectors. But uneven and geographically dispersed natural resources have created a picture where power is plentiful in some regions of the country, while incredibly scarce in others. Currently, Indian power generation sector is dominated by coal based plants (~55% of 182 GW installed base is coal) primarily concentrated in the eastern part of India (Jharkhand, Orissa etc). Meanwhile, the northeastern part of the country is ripe for with potential for new sources of hydropower. In the southern and coastal parts of India, you will find a high concentration of wind resources, whereas in the western and central parts of India, the opportunity for solar is abundant.

The key challenges facing India's power infrastructure are two-fold. First, realizing the opportunity to develop new sources of wind, solar and hydropower to bring power capacity in line with the country's power needs; and second, strengthening the transmission system across India to enable existing and new sources of power to



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reach more people. The latter will require technology that allows sufficient amounts of power to be transmitted over long distances more efficiently with minimal losses. This is something we are seeing an increased emphasis on within the country.

The utility in India is currently implementing multiple transmission corridors comprised of High Voltage Alternating Current (HVAC) (400 KV, 765 KV and under evaluation 1200 KV) and High Voltage Direct Current (HVDC) (+/-500 and +/-800 KV). Utilities also are taking advantage of flexible line loading with the addition of reactive power controlling devices to handle power flow and optimal usage of corri-

dors. Having more control and flexibility is critical. With long distance grid networks, mismatches in power generation and demand and impact of power exchange, the transmission network in India faces many operational challenges.

To overcome these challenges, deliver the right solutions, companies are exploring the implementation and deployment of Smart Grid Technologies.

The utility in India is planning for full scale deployment of WAMS (Wide Area Measurement System). WAMS implementation will enable grid operators to enhance operational efficiency & grid stabilities capitalizing Remedial action scheme (RAS) and system integrated protection scheme (SIPS). There is excitement about the opportunities that exist to improve India's power infrastructure. And in the process, we will have a roadmap for solving similar problems in other parts of the world where providing power over long distances is an issue.

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