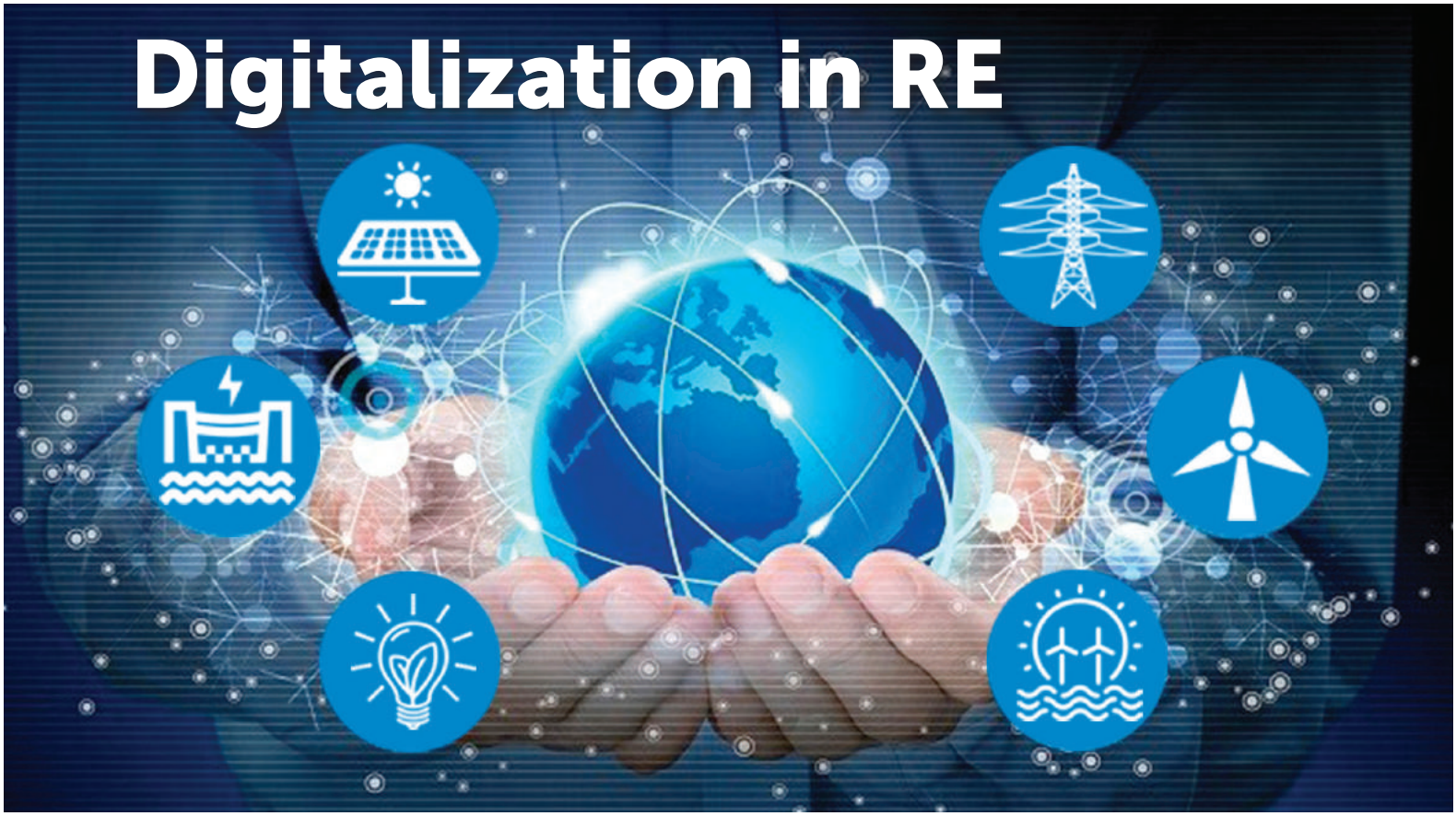
Digitalization in RE



Digital technologies such as big data, blockchain, distributed energy resource management and cloud computing are addressing some of the key challenges in the sector, writes ***Sanjeev Sinha***, President – IT & Digital Transformation, India Power Corporation Ltd.

The whole power industry is in a state of transition with significant changes and new challenges. Within it, the renewable energy sector has been growing more over last couple of decades compared to other energy sources like coal or nuclear which has seen declining trend. Renewable energy has also been changing due to increasing numbers of consumers becoming producers. Hence, the challenges include integration of renewable and decentralized energy sources and the need for continuous grid optimization. Globally, China has been the biggest investor in renewable energy followed by US, UK, Japan and Germany.

One of the key drivers of investments in renewable energy is digitalization, which not only maximises return on investment but also minimizes their risk of investment. Hence, digitalization has created new business models and revenues not only in clean energy sector but overall in power industry. Therefore, digitization is playing an important role in the entire energy conversion chain from generation to transmission and distribution to the final consumer of electricity.

Digitalization typically involves creation of data points, collection of data through these data points and then using them for betterment of business. This may mean plain vanilla reporting, intelligent reporting, alerts mechanisms, and analytics of data collected to provide insights. Such gathering of data, network management and accompanying analytics form the basis of competitive advantage in the energy sector. Through digitalization, energy companies can benefit in three key areas: Reliability, Operational Efficiency and Cost Efficiency.

The trend of consumers becoming producers, also called Consucers, is gaining momentum with more and more consumers installing solar panels on their roof tops and trading energy with service providers. Thus, digital technologies are making them derive greater value from their assets. The largest driver for digital technology revenues is therefore smart meters, which are

estimated to be growing at 44 percent growth rate today.

Digital technologies such as big data, analytics and machine learning, blockchain, distributed energy resource management, and cloud computing, are widely playing their role in digitalization and addressing some of the key challenges in the energy sector – intermittency, aging grids, balancing distribution-connected generation, managing consumer self-generation, and coping with increasing system complexity.

IOT (INTERNET OF THINGS)

IOT devices provide perfect data capturing mechanisms and can be excellent data points. They can connect almost everything. With IOT, one can get the longterm value of connected things and derive value from mining the generated data and using it for important applications that can be repeatedly monetized. In this sense, data becomes the operational currency of a transforming energy industry. For instance, transporting and analyzing data from wind turbines has high value to grid operators, and companies offering these types of networking or data analytics services can reap the benefits.

Similarly, value from smart meter data is the ability to more accurately measure consumption for load management and billing purposes. In commercial buildings, connected devices and integrated energy management systems generate data that is crucial for reducing heat or cooling in underutilised zones, or adjusting lights when offices or spaces are empty. In each of these scenarios, having real-time data from devices has enduring value. Using the IOT, a system is less susceptible to outages and potentially costly security breaches. By installing a simple, end-to-end solution using IOT, one can manage even the largest solar grids in the world.

ENRICHING REPORTS

IOT and other similar data capturing mechanisms in renewable energy allow data enrichment with data integrity, paving way for improving level of reporting system for operational efficiency. Typically, the following maturity levels are achieved in a gradual manner:

- Level 0 – Spreadsheets
- Level 1 – Operational Reporting
- Level 2 – Query & Analysis
- Level 3 – Dashboard Management
- Level 4 –Online Analytical Processing
- Level 5 – Data Mining

Achieving higher maturing level in reporting systems allows energy companies to derive maximum benefits in decision making. Moving up this maturity level is a time taking process and eventually results in using data more intelligently – an area called business intelligence or BI. Adoption of business intelligence reporting systems significantly improves decision making since data shows more insights than what's otherwise visible. For example, BI can help in taking a step towards energy efficiency by the better utilization of electronic items, more usage of solar and renewable power resources, using less energy-guzzling devices, etc.

Most BI solution in energy domain helps in better decision making in business areas such as

- Demand Intelligence: Reports and historical trends from historical data to be used affectively to estimate energy supply and demand, monitor energy cost, track and monitor service availability, downtime, monitor energy and utility demand and distribution etc. It thus helps in developing sustainable distribution models.
- Risk Intelligence: A proper BI solution should be able to get risk-reward curves to determine risks.
- Asset Intelligence: It should help in asset monitoring with real time alerts and monitoring dashboards.
- Customer Service Intelligence: Providing dashboards to monitor and streamline customer interactions to reduce cost and increase efficiencies.

BIG DATA ANALYTICS

To take full benefits of analytics in renewable energy space, one should look at it as a digital journey and make it a continuous process to derive maximum value. Once the data capturing mechanism is in place, the data thus collected would allow energy service provider to adopt descriptive analytics wherein users move to dashboard reporting, create own ad-hoc reports, create alert mechanisms and even analyse past data to get better insights. Once such data are collected for a reasonable period, they become extremely useful to create forecasting models.

A leading renewable energy solutions provider based in India uses forecasting models to forecast energy output across windfarms in India. Such a forecasting energy output is reported for feed into national grid well in advance. Big data has been useful in building predictive algorithms by leveraging statistical models and data sciences for predicting outcomes. Thus the predictive model developed are used for predicting power production in various wind farms using the past data collected from its respective wind mills and wind farms.

Such forecasting models may also be used in forecasting failures of machines resulting in better preventive maintenance. Hence, these forecasting models would help in changing from reactive maintenance to preventive maintenance thus saving significant cost of downtime.

Smart devices and sensors, for example, can send information from remote equipment that indicate that a failure is imminent and should go through preventive maintenance immediately to avoid costly downtime or damage. This functionality is particularly helpful in mission-critical industrial or commercial settings. For instance, a utility managing a solar facility would want to know about a faulty inverter ahead of an expected increase in demand so it could be repaired before the event, or make contingency plans to ensure the continuous flow of power to the grid. Likewise, a facility dependent on refrigeration equipment would want to know ahead of time if a unit was about to go down and repair it in advance to avoid a more costly outcome. Moving from reactive maintenance to preventive maintenance can significantly reduce cost of downtime.

Digitization in renewable energy will continue to be the key driver of the sector and be the change enabler creating more business models. It definitely necessitates newer thinking.

Transporting and analyzing data from wind turbines has high value to grid operators, and companies offering these types of networking or data analytics services can reap the benefits

(Views expressed are personal)