Sector Analysis:

Energy & Utilities

Organisations in the Energy & Utilities industry are faced with unprecedented opportunities and challenges in terms of:

- Customer demand for improved, personalised and value-added products and services.
- Elevated expectations on service reliability and operational efficiencies.
- Expectations of increased ROI from CAPEX and OPEX initiatives.
- Managing the impact of deregulation and market reforms.
- Compliance to changing regulations (including environmental regulations).
- On the other hand, in the Energy industry, the focus is on reduced cost and sustainable profitability to adjust "lower-for-longer" oil prices.

Being an asset and engineering heavy industry, Energy & Utilities has traditionally been synonymous with slow yet steady growth, coupled with a delayed speed of adoption of technology and innovation in comparison with other industries. **However, the opportunities and challenging are making it imperative for organisations to transform themselves. A few areas are spotlighted below:**

Increasing use of Renewables, Distributed Energy platforms and Digital oil field capabilities

Renewable generation technologies can be viewed as those with storage (hydropower, biomass, concentrated solar power) and those without storage (mainly photovoltaic solar and wind). Advances in storage technologies enable the scalability and proliferation of renewables. Such advances enable acceleration of Electric Vehicle adoption aided by maturing of attendant capabilities such as charge pricing, demand management, and so on. Microgrids as a service is predicted to create a new revenue stream for up to 25% for

Utilities have been synonymous with slow yet steady growth, and slow adoption of technology. On the other hand the Energy industry focus is on ensuring sustained profitability in view of "lower-for-longer" oil prices. Today Energy & Utilities organisations need to transform themselves aided by digitalisation, AI/ML and other IT advances.

Utilities in a few years' time. In the DER (Distributed Energy and Renewables) economy, blockchain enables orchestration of the ecosystem with capabilities for self- authentication, automatic yet secure settlements, and so on.

Digital oil field today allows companies to analyse large volumes of data by using sophisticated engineering technologies such as down-hole multiphase sensors, measurement-while-drilling (MWD) applications, 4-D visualisation and modeling, and Remote communications technology.

Use of digitalisation and AI/ML in operations

- Industrial IoT & Digital Twins: software model that bridges physical systems and the digital world aided by IoT.
- Edge analytics with cloud computing is used to speed up communication with telemetry devices.
- Self-healing networks: enable remote identification of fault location, isolation and restoration.
- AI/ML for predictive asset maintenance and peak load forecasting: deep learning and reinforcement learning are used to develop models.
- Drones for asset inspection and maintenance: for real-time monitoring and assessing asset health to predict potential asset failures and trigger actions to fix-before-fail.
- Collaborative robots: drones and smart helmets assist humans as a guide or assistor in specific tasks.

Use of technology to deliver personalised and value-added services to customers

- Digital Commerce: rise in use of COTS platforms such as SAP Hybris and Drupal Commerce.
- Accelerate customer self-service: leverage digital channels, chatbots and virtual agents to enable customers to self-serve through customer journeys.
- Speech and social media analytics for effective customer sentiment analysis to trigger relevant actions.
- Use of automation: in billing and customer services, work-flows, among others.
- Integrated demand side management: increasing the numbers of commercial customers that will participate in integrated energy efficiency and demand response programmes for demand side management.
- Open data access and frameworks: to link customer and multiple data points from smart meters thereby enabling Utilities to provide customers with the ability to track and manage their energy usage, as well as promote Energy-as-a-Service offerings.

Tariff/Rate and Regulation management by use of measures that improve operational effectiveness

- Performance-based rate mechanisms: regulators are emphasising outcome-based delivery models with risk and rewards linked to the performance of Utilities against specific targets, measured and monitored by defined KPIs for rate determination.
- Amending existing Net Metering rules: regulators are embarking on alternative rate designs and successor tariffs for NEM (Net Energy Metering) customers.

Cybersecurity of critical infrastructure

- Growing adoption of IoT devices (expected to be ~12 Billion in a few years) have significantly increased the cybersecurity attack surface for organisations, specifically for organisations with critical infrastructure.
- In a few years, 30% of Utilities' approach to security will be based on a resilience-oriented model, integrating IT-OT (Operations Technology), cybersecurity and physical security, informed by data protection and privacy.

Insightful use of technology to transform organisations is best captured in the following industry examples:

1. One of the UK's leading power and gas companies has implemented "The Saving Energy" toolkit to help customers understand energy usage pattern on a month-by-month basis and achieved 10-15% reduction in customer churn.
2. A leading Australian Utility firm has achieved >30% Peak Demand reduction by developing a Virtual Power Plant (VPP) consisting of solar panels paired with batteries and a smart inverter, controlled via intelligent software.
3. National Grid, UK is in discussion with Google to implement Demand Forecasting for grid balancing by employing the search giant's DeepMind AI platform.
4. A Canada based Utility major, in association with an SI, implemented an asset investment planning solution that leverages AI-based algorithm to predict potential failures of assets resulting in 5-10% savings in annual insurance premium, 20% enhanced portfolio optimisation and ~ 3-5% cost reduction in annual contracted materials and labor.
5. A North American Utility leveraged Advanced Pattern Recognition software that uses ML, and achieved $31.5+ million of cost avoidance in 3 years and saved an estimated $4.1 million in monitoring costs.
6. A SI deployed an insight driven-transformation solution for a Water Utility in UK, that analysed multiple data types from different sources (SCADA/telemetry/ERP/GIS/ external sources, and so on), to proactively detect water supply pipeline leakages and gains significant intervention lead-time.
7. Automation BOTs are used to manage billing for a major commercial & industrial organisation releasing ~15 full-time employees to value-added functions.
8. Shell is using Salesforce Einstein's inputs to make better decisions in running some of its retail business processes.
9. GE's wind farms use site-level analytics to support 20% increase in energy production and around $100 million in extra revenue over the life of wind turbines.
10. GE announced agreements with large and small Oil companies to implement digital devices, sensors and databases to predict equipment breakdown before they occur and improve production efficiency in deep sea and offshore platforms.
11. A US-based Oil & Gas service provider deployed a cloud-based IoT solution for real-time streaming analytics of geospatial data. Using ML for automated quality control of data, the speed of transaction processing was increased from 280+ K/sec to 1.5 M/sec for over 1 billion records per day.

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