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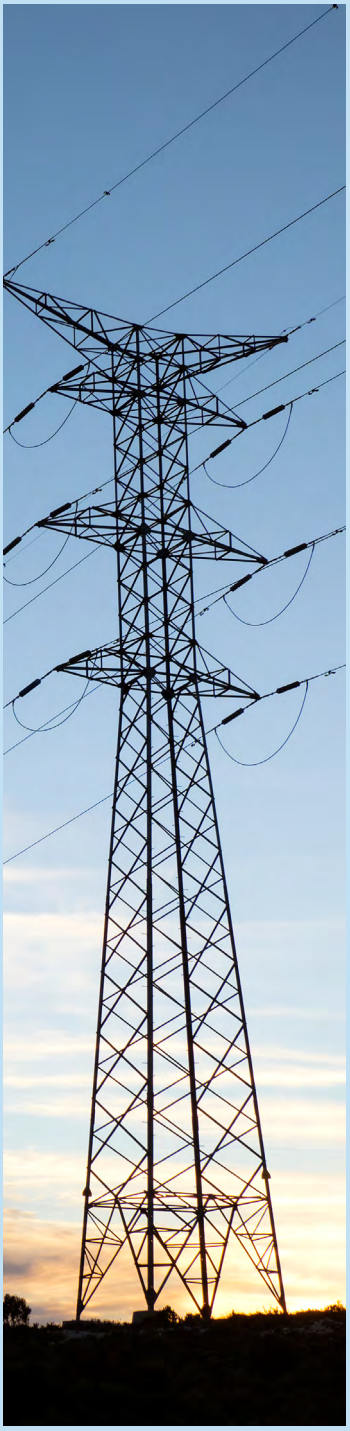

EMPOWERING THE UTILITY ECOSYSTEM WITH BLOCKCHAIN

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Governments, regulatory bodies, and consumers are pushing utilities to reduce their environmental footprint and adopt greener standards. The need is to be sustainable from generation to consumption and this can be largely achieved with digital technologies. Utilities are facing several challenges in their digital transformation journey, such as ensuring security, adapting to changing consumer demands, aligning to new business models, and scalability. In this time of flux, blockchain offers interesting solutions. This point of view explores how.

The time is ripe for technologies that foster transparency

Utilities have traditionally operated via a centralized unidirectional grid. Their business model is focused on delivering electricity in a reliable and safe manner from large power plants across hundreds of miles of transmission and distribution lines, to consumers. The growing number of consumers and dependence on fossil fuels have resulted in a resource shortage and sometimes unreliable power supply. Consumers played a passive role for a long while and had little visibility into their energy consumption patterns.

The utility industry, however, is set to change. This change is being brought about by deregulation, and low-cost renewable energy generation by customers and communities. Infrastructure in the utility industry is evolving too, as it prepares to transition from an analog, centralized, and standardized model to one that is digitalized, distributed, and prosumer driven. New developments, such as the smart grids local generation and local storage is creating opportunities for utilities to engage with customers in demand response management. The energy from prosumers lets utilities handle intermittent change in demand, create a marketplace for peer-to-peer trading, and deploy electric vehicle charging infrastructure thereby creating new revenue streams for all stakeholders in the value chain.

With the increased integration of distributed energy resources and actors, there is a need for collaborative communication and data exchanges in a complex and multi-agent environment. We see blockchain as a secure, immutable technology, making this happen. In this point of view, we will review the many possibilities that blockchain offers utilities, the challenges they face in adoption, and how this technology can become a key enabler after the challenges are addressed.

Challenges faced by the utility industry

Electric utilities are usually averse to risk and have below-average market volatility. They are now having to deal with several challenges that not only introduce risk and uncertainty in their environment but are also slated to disrupt their business model over the foreseeable future. Some of these challenges are,

Increasing energy demand: In the next decade, electricity demand is likely to increase drastically due to economic growth in Africa, Asia, and Latin America. We will also see electrification of the transportation industry. Massive new investments will be needed to keep up with the increase in demand. According to Bloomberg Research, global electricity demand will increase by 57%, by 2050.

Security: A recent survey by Siemens suggests that 54% of utilities can expect a cyberattack. Customer data breaches, unauthorized access to physical assets, and cyberterrorism are among the leading concerns. In March 2019, the U.S. Department of Energy reported that grid operators in Los Angeles County, and Salt Lake County, suffered a DDoS attack that disrupted operations but did not cause any outages.

Maintenance costs: Digitization and maintenance of aging infrastructure are huge investments. According to BloombergNEF, the average life of an asset is 30 years, and the total cost of replacing aging assets is a whopping $4.8 trillion. If utilities continue to spend at this pace it would take just under 231 years to complete their up gradation.

Changing business model: Thus far, the conventional utility business model succeeded in delivering accessibility, safety, and reliability. However, the Paris Agreement demands zero carbon emissions by 2050 and is driving a new business model – towards renewable energy adoption.

System scalability: The current structure of utilities hinders scalability, reliability, affordability, and prevents DERs from participating in the energy market.

Blockchain adoption is picking up steam in the utility industry

As per PricewaterhouseCoopers, Utility companies are increasingly reporting higher energy generation costs and lower revenues. At the same time, regulatory authorities are demanding that utilities increase transparency. As a result, several cost-saving and efficiency improvements in the operation of energy systems and markets are worth investigating.

According to a Utility Blockchain Applications Market Overview Report by Navigant Research, blockchain adoption in Utility industry is expected to grow at 50% CAGR and investments are projected to reach $3.7 billion by 2026.

Empowering the utility value chain with blockchain

The potential for blockchain is present across the utility value chain from generation to customer relationship management. As utilities pursue these opportunities, the benefits are already being felt by end consumers by way of mobile-based bill notification, presenting, payment and outage management.

Spare parts inventory management and asset maintenance: The utility industry is facing a challenge to maintain the right inventory of spare parts and asset management. Most utility companies maintain a surplus spare parts inventory; and unplanned downtime can cost as much as $260 K1 per hour. A distributed ledger technology (DLT) based platform can help the industry leverage just in time inventory and prescriptive (milestone-based services) and condition-based asset maintenance (ambient and performance-based service) to reduce the unplanned downtimes and outages. REC issuance and trading marketplace: Utilities are challenged by the manual effort of verifying power generation, recording meter readings, exchange cost, and post-trade paperwork overheads. A DLT platform can automate the issuance of REC's and provide a marketplace for trading between generators and obligated organizations or voluntary companies and would yield a 10%2 reduction in operational expense in REC issuance and trading.

Wholesale energy trading: Wholesale energy markets consist of complex procedures and involves third-party intermediaries such as trading agents, exchanges, brokers, price reporters, logistic providers, banks and regulators. It translates into high transaction costs due to brokers for trade execution and high operational costs due to post trade reconciliations through third parties. Blockchain has the potential to integrate the entire trade's life cycle and reduce its costs by 30-60%3 through disintermediation and automation of post trade reconciliations.

Decentralized smart grid: The centralized grid infrastructure fails to efficiently utilize the electricity generated by DERs and respond to demand variations. A decentralized smart grid can effectively utilize energy generated by DERs and meet capacity demands.

P2P trading marketplace: As solar photovoltaic (PV) became affordable, the number of PV installations by individual homeowners is increasing. However, the surplus production of energy is not being utilized effectively due to a lack of grid infrastructure and insufficient incentives for prosumers. A blockchain-based marketplace allows smaller energy prosumers to sell their surplus energy directly to other consumers without intermediaries. This enables a potential energy cost savings of $1304 billion per annum through reduction in the transmission and distribution losses by 60-80% for all stakeholders and creates opportunity for self-sufficient local energy markets with minimal dependency on the main grid.

Demand response: Balancing the supply and demand of variable energy sources such as wind and sun is an industry challenge. DLT can offer real-time mapping between actual supply and demand.

Back-office process automation: Administrative processes, post-trade reconciliation, order to cash and billing (supplier switching, address change, or product change, etc.) are complex and error-prone.

Process-efficiency opportunities are present across the value chain right from generation to consumption. A DLT based platform will help in interoperability of disparate data across multiple systems and automating the recurrent processes to improve the operational efficiency. As per a survey, 55%5 utilities will automate and optimize business processes for improved efficiency.

Regulatory oversight: Policymakers and regulatory bodies face a challenge in ensuring compliance by utility companies. Regulation demands complete adherence to key areas like price reporting, operational safety, cybersecurity, and trade surveillance. Immutable ledger technology and transparency can significantly improve auditing and regulatory compliance in security, record management, risk management, and business performance.

Deploying blockchain in the utility ecosystem

Blockchain along with other Digital technologies helps to improve operational efficiency and flexibility throughout the utilities value chain. Conservative estimates supported by analysis of real-life cases suggest that digital optimization can boost profitability by 20 to 30%6. New revenue streams like Marketplace for P2P trading and EV charging infrastructure can improve topline up to 20%[5].

Conclusion

Blockchain has the potential to optimize operational costs, increase operational efficiency, enhance transparency and reduce expensive infrastructure upgrades for the Utilities industry. Utilities can unblock new revenue streams by empowering consumers and prosumers to play a more active role in Utility markets.

The approach for implementation of Blockchain is always calibrated – and therefore value is realized gradually from an organically evolving solution across the value chain right from Generation to Retail and Back office.

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Divik handles global engagements in Healthcare, Life Sciences, Energy and Utilities in Blockchain. He offers executive level advise and thought leadership focusing on how blockchain can be applied to specific business units and how it is disrupting organizations. He also has expertise to undertake assessment of corporate strategy to evaluate blockchain potential applicability and business impact.

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