

POV

AI in Utilities

AI has the power to transform the Utility industry right from its operations and business model to customer engagement for electric, gas, and water and help build a city of the future.

Author: **Nazim Shaikh**, Senior Manager, Digital Consulting

What if someone could look through every customer's monthly billing data and tell if someone's refrigerator will break down in two months? No, it is not a pipedream; in fact, there are companies existing today who go through the smart meter data to tell you just that! This will be highly beneficial to equip utility customers with personalized recommendations and improve customer service. AI is at the forefront of almost all industries across the board from retail to financial services to manufacturing. In fact, it is safe to say that Utilities have been a late adopter to AI partly due to the regulated nature of the business.

AI at its most basic is a series of systems that act intelligently. From a siloed system standpoint, it can be autonomous decisions made in one silo or one can think of it as a network of intelligent decisions across the board including several different datasets and data sources such as SCADA, Advanced Metering Infrastructure, third-party data like weather, seismic data, vegetation management, etc.

AI can fundamentally change how we live our lives in a sustainable ecosystem. In fact, EPRI released a National Electrification Assessment that outlined the societal, customer, and utility impacts of electricity providing up to 50% of final energy consumption by 2050. The results: Increased grid efficiency and flexibility, improved human health thanks to better air quality, reduced energy consumption and consumer costs, and significantly lower greenhouse gas emissions, even in the absence of climate policy. However, the key to unlocking these innovation opportunities lies in selecting the right approach and strategy to realize the full potential of AI.



Trends and Opportunity Areas across Smart City, Energy, and Water Utility Operations

The smart city encompasses innovations across infrastructure and electric and water utility operations and AI forms the bedrock of this development. Today, the world is at the bleeding edge of technological advancements, and there exists a goldmine of opportunities for industry-defining work in the areas of smart metering, solar and wind energy, water and waste management as well as in transmission and distribution domains. In this respect, there is a need to go beyond utility experience and bring the best of technology that can be leveraged to meet the vision of the “city of the future” from across multiple industries.

The smart city of the future will have a centralized Advanced Operations Center powered by AI to provide intelligence, insights, and an automated city-wide emergency and disaster management response system. It will have real-time telemetry, spatial intelligence and dashboards, SOPs and alert management system, a search and collaboration facility, and the ability to share dynamic data between multiple stakeholders. Wouldn't it be great if the city operations center could mimic human behavior and provide intelligence in case of city traffic jams, flooding, and accidents and even go to the extent of predicting them in the future



for timely actions? The current trends in technologies give such AI-powered use-cases relevance in making city operations and management smart across multiple areas of –

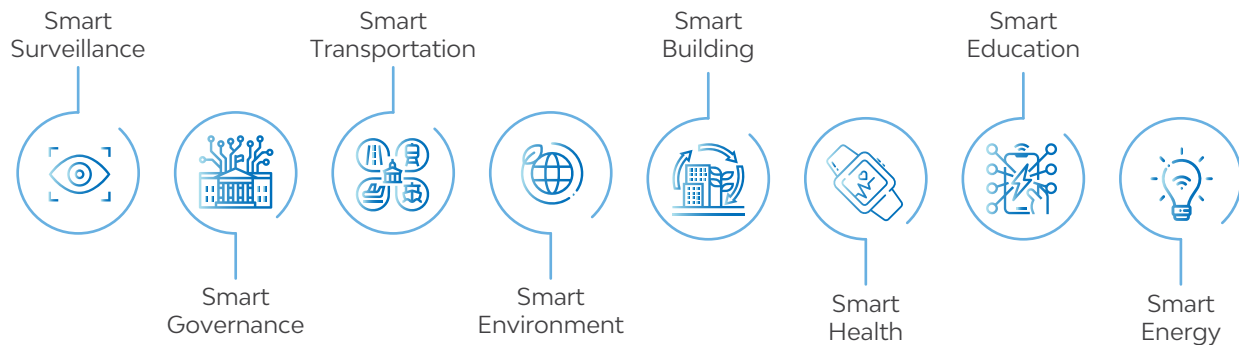


Figure 1: Focus Areas for Smart City

Utilities will be one of the dimensions of smart cities. AI plays across the value chain for electric, gas and water utilities. It applies from making utility operations efficient from grid operations to energy/water management. AI can also enable utilities to “Walk into customers’ minds” rather than just being a necessity. To accentuate this point, refer below to understand how AI can fully transform the business value chain for electric and water utilities.



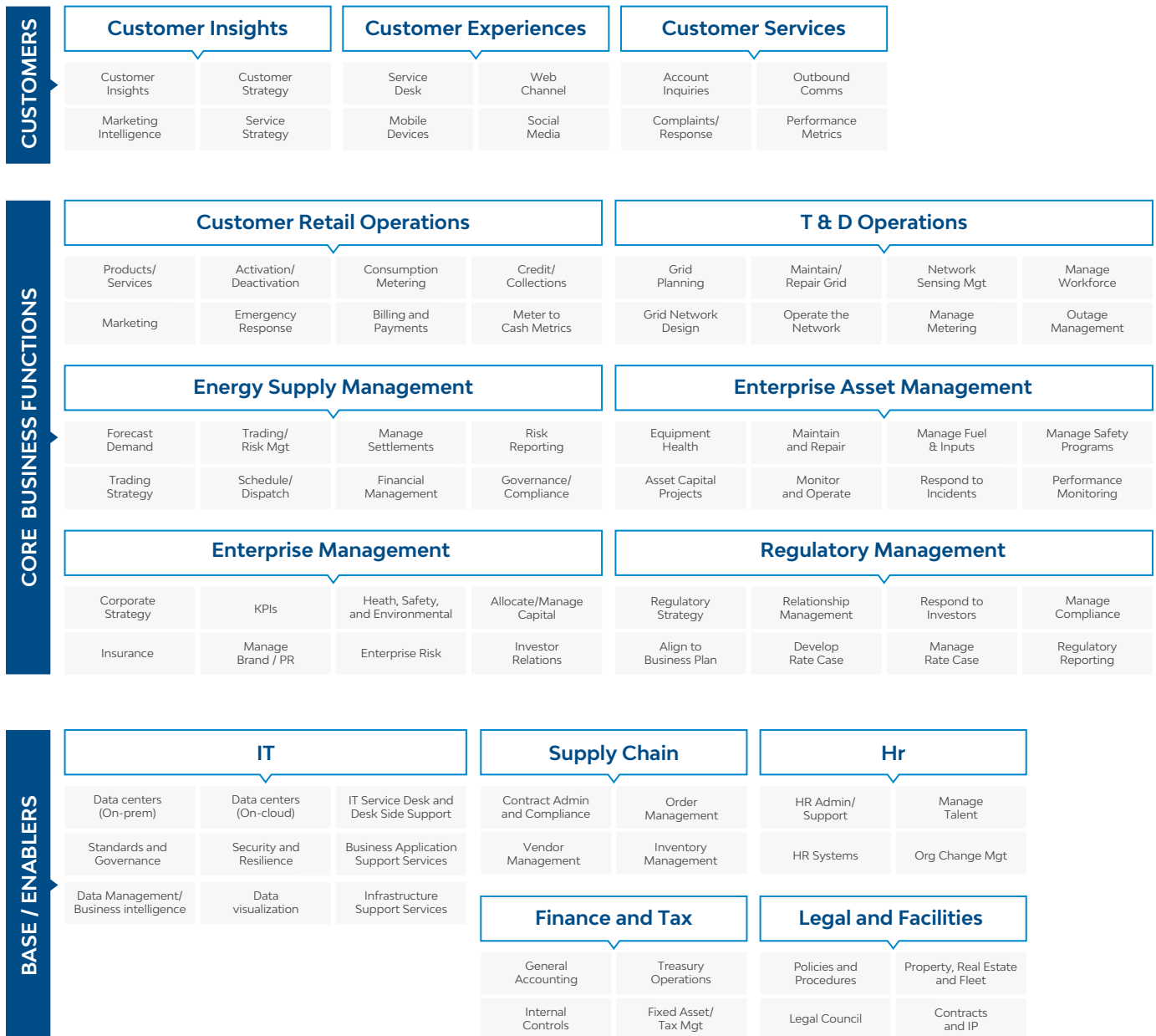


Figure 2 - Business Value Chain



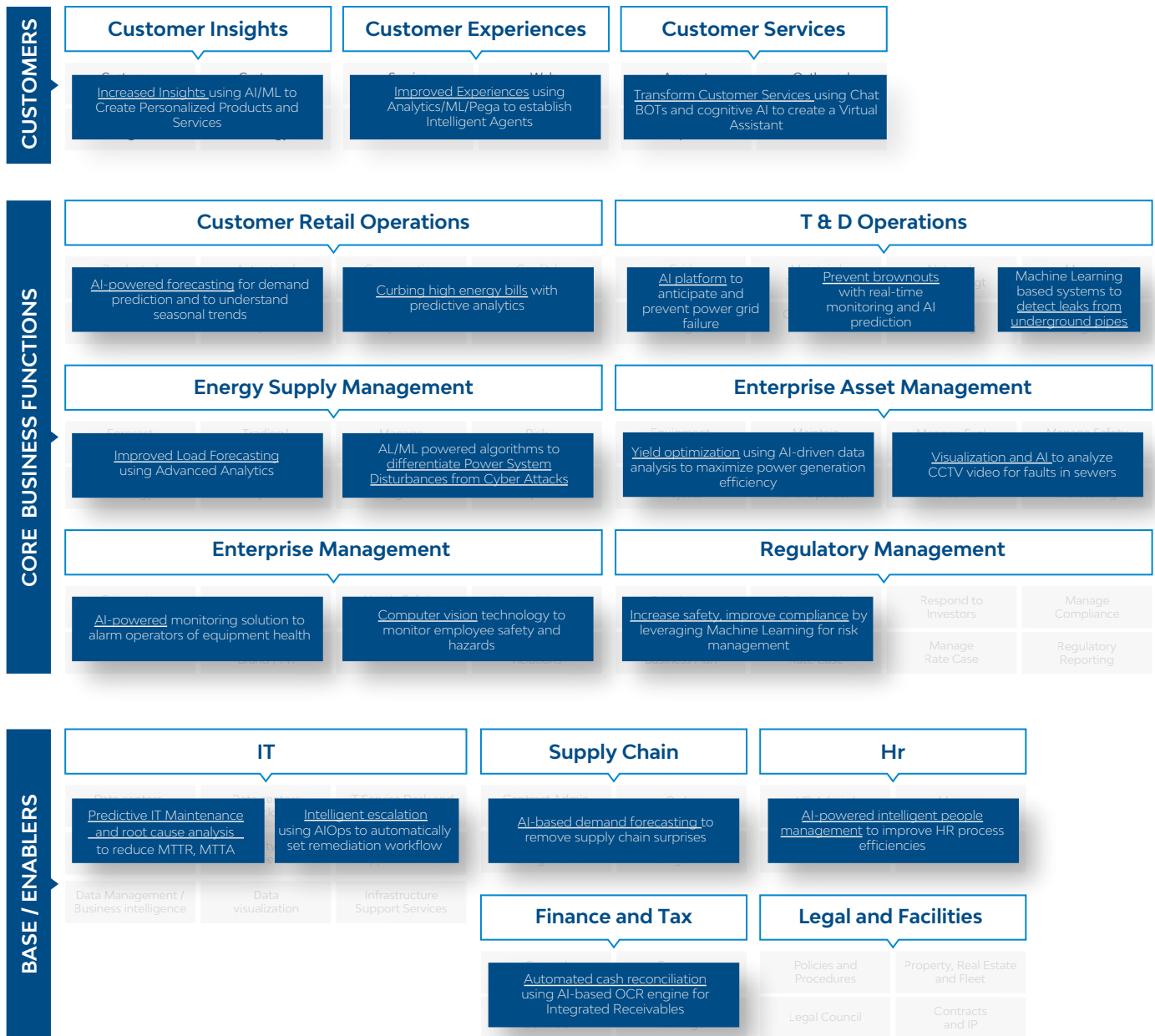


Figure 3 - AI powered Use Cases for Electric and Water Utilities across business value chain

Many AI use cases exist. It is not our intention to describe each of them in detail. Here we have focused on some of the most cutting-edge work in the field of AI and ML that has the power to move the needle on the metrics that drive most value for utility customers.



Electric Utility



Demand Forecasting

The advancements in neural network studies can help corporations through machine learning to increase the use of renewable demand and supply predictions and further saving.



Energy Management

Commercial organizations can streamline energy management using AI and can trim energy consumption by at least 10%. AI software can monitor the electricity consumption patterns in real-time to come up with an optimal strategy for saving and adjust the demand wherever required automatically.



Wind Farm Projects

Optimize energy production and pre-empt failures, advanced analytics software featuring AI algorithm to signal trouble in monitored equipment.



Energy Storage and Switching

AI-powered electricity load management systems (batteries) for reducing electricity costs and managing the storage and consumption of electricity from batteries. AI software can pair customers' energy storage systems in real-time with artificial intelligence, thus creating a 'virtual power plant,' which businesses can use whenever other sources of electricity are unavailable or expensive, automating energy saving.





Asset Management

Digital Twin (DT) technology for monitoring and maintenance, life cycle management, vegetation management, real-time visibility, and flexibility for machine scenario planning. Use of drones and AI to inspect transmission and distribution assets and identify equipment at risk of failure in a manner that is much faster and safer.



Predictive Maintenance

AI-powered cost-effective defect monitoring solutions. Predictive analytics to alarm operators of equipment health, enabling proactive actions to prevent cataclysmic events impacting the environment, health, and safety; computer vision technology to recognize patterns and alarm in case the employee is not dressed adequately for a set of operations.



AI-powered Cybersecurity

Encrypted AI tools to make enterprise security resistant to cyberattacks. Sensory video cameras monitor security threats all day.



Emission Tracking

AI software to measure, track, control, and manage GHG emissions from pipelines and plant equipment.



Water Utility



Real-Time Monitoring

A digital command center leveraging artificial intelligence can monitor and manage the water utility's service channels such as website, smart app, and digital infrastructure such as SAP and smart grid metering systems.



Water Leakage Detection

Applying a machine learning model using advanced analytics on data collected from sensors in pipelines means that water engineers can find leaks more accurately and manage leakage operations more effectively.



Predictive Wastewater Treatment Plant Control

AI software can help water companies by collecting real-time data on the plant's flows and qualitative measurements, including those for ammonia, nitrates, oxygen, phosphates, and dry solids, and perform advanced analytics using machine learning algorithms to provide operators and managers with predictive insights while improving plant performance.

The market for AI in Energy and Utilities is forecasted to reach \$4.5 billion by 2026 indicating how most companies are heavily invested in AI and trust its potential to completely transform the future utility business. As society becomes more and more environmentally conscious, with a higher percentage of adults prioritizing DERs and renewables over traditional energy sources, machine learning and AI-based applications are slated to become the technologies of the future to enhance the overall efficiency of the energy and utility ecosystem.



Author details



Nazim Shaikh

Senior Manager, Digital Consulting

Nazim is a seasoned professional with more than 10 years of experience in Energy and Utilities businesses. He helps global clients solve business problems and transform through disruptive thinking, business context and advisory driving strategy and execution. For the past three years, he has been instrumental in growing LTIMindtree's Utilities business by bringing his expertise in leading global teams, developing innovative solutions, and building lasting relationships in large programs. Prior to LTIMindtree, Nazim has worked with a downstream oil and gas marketing with BPCL, managing a network of channel partners and vendors in some of India's largest districts. He is passionate about sustainable solutions, next-gen companies, and platform business models. Nazim holds a Bachelor in Electrical Engineering and an MBA from Indian Institute of Management, Bangalore.



LTIMindtree is a global technology consulting and digital solutions company that enables enterprises across industries to reimagine business models, accelerate innovation, and maximize growth by harnessing digital technologies. As a digital transformation partner to more than 700 clients, LTIMindtree brings extensive domain and technology expertise to help drive superior competitive differentiation, customer experiences, and business outcomes in a converging world. Powered by 84,000+ talented and entrepreneurial professionals across more than 30 countries, LTIMindtree — a Larsen & Toubro Group company — combines the industry-acclaimed strengths of erstwhile Larsen and Toubro Infotech and Mindtree in solving the most complex business challenges and delivering transformation at scale. For more information, please visit <https://www.ltimindtree.com/>

LTIMindtree Limited is a subsidiary of Larsen & Toubro Limited