# AI's Transformative Impact on Power Distribution Utilities
## A Journey towards Efficiency and Sustainability

## BY ASHWINI GAJANAN CHAVAN

In the ever-evolving landscape of technology, few advancements have captured the imagination as profoundly as artificial intelligence (AI). Its far-reaching influence spans across industries, creating innovative pathways for businesses to thrive and society to progress. Among the most promising domains where AI demonstrates its potential is the power and utilities sector. In this article, we delve into the remarkable applications of AI in enhancing service operations within power distribution utilities while simultaneously fostering sustainability.

According to the "State of AI-2022" Survey conducted by McKinsey & Company,

## AI's primary applications lie in optimising service operations.

Among the sectors that are most primed for this transformation, Power Distribution Utilities stand out prominently. This underscores AI's potential to drive efficiency and innovation in the industry.
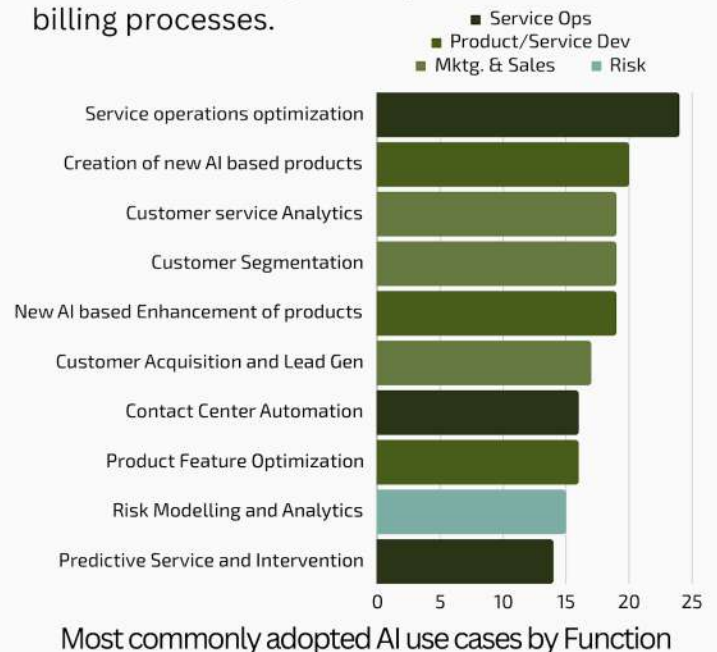
### Revolutionizing Service Operations
The Ministry of Power in India has embarked on a transformative journey through its Revamped Distribution Sector Scheme, outlining ambitious objectives for the sector's advancement. These include the reduction of pan-India AT&C (Aggregate Technical and Commercial) losses to 12-15% by 2024-25 and the elimination of the ACS-ARR (Average Cost of Supply-Average Revenue Realized) gap within the same timeframe. Additionally, the scheme aims to enhance the quality, reliability, and affordability of power provision while ensuring the financial and operational sustainability of the distribution sector.

Achieving these goals necessitates a deep understanding of consumption patterns, operational efficiency, and customer engagement. Central government finances the majority of the DISCOMs. To gauge the performance of DISCOMs, the government employs Integrated Ratings, where financial sustainability holds a significant weight. This underscores the necessity for an efficient mechanism to capture energy consumption and ensure prompt bill payments. Enter AI-based tools – a crucial enabler for tackling these challenges head-on.

### From Manual to Automated: AI's Inroads
At the grassroots level, manual entry of energy meter readings into apps or meter reading devices has been common practice. However, the 11th Annual Integrated Rating and Ranking of DISCOMs Report by the Ministry of Power (April 2023) highlights the need for automation and AI-based tools. AI-driven applications can now extract meter data from images, reducing billing errors and enhancing accuracy. This automation not only saves time but also enhances customer satisfaction through transparent and reliable billing processes.

Legend:
- Service Ops
- Product/Service Dev
- Mktg. & Sales
- Risk

Most commonly adopted AI use cases by Function

- Service operations optimization
- Creation of new AI based products
- Customer service Analytics
- Customer Segmentation
- New AI based Enhancement of products
- Customer Acquisition and Lead Gen
- Contact Center Automation
- Product Feature Optimization
- Risk Modelling and Analytics
- Predictive Service and Intervention

(x-axis: 0, 5, 10, 15, 20, 25)

Furthermore, the power distribution sector's frontline employees engage in extensive fieldwork, demanding actionable insights from available data. Relying solely on human analysis consumes valuable time and delays crucial actions on consumer premises. Here, AI steps in as a force multiplier. Leveraging comprehensive monthly and yearly consumer data, AI applications can provide predictive analysis to offer insights into sudden consumption drops or energy non-usage. This facilitates the detection of theft and unaccounted energy units, safeguarding the integrity of the system.

### AI's Pervasive Reach: Transforming Revenue Generation

Certain high-load consumers operate under Time of Day (TOD) tariffs, equipped with automatic energy meters. These meters provide a wealth of data, which, when integrated with AI systems, allows for the analysis of critical information. The AI-based approach enables prompt identification of energy unit losses and empowers DISCOMs to monitor high-revenue-generating consumers more effectively. Given that these consumers contribute to a significant portion of revenue (80%), the impact on the bottom line is substantial.

### Predictive Insights for Operational Excellence

DISCOMs possess historical data on power interruptions across feeders, a goldmine of information AI can unlock. Employing AI-based predictive analysis on this data assists in materials planning, resource allocation, maintenance prioritisation, and scheduling. By minimising distribution losses and optimising resource utilisation, AI transforms maintenance from reactive to proactive.

### Stitching together Fragmented Data

In an era marked by data-driven decision-making, the integration of fragmented data silos becomes paramount. DISCOMs often grapple with disjointed information on payment history, consumption patterns, registered theft cases, and customer complaints. AI systems bridge these gaps, establishing logical connections that provide a holistic view. This integration empowers DISCOMs to make informed decisions, personalise customer interactions, and streamline operations efficiently.

### Paving the Way Forward

As the power and utilities sector sets its sights on the future, AI emerges as an indispensable tool to achieve the central government's objectives of financial sustainability and operational efficiency. Collaborative efforts between government bodies, utility companies, technology providers, and consumers are key to fostering responsible AI integration. Clear regulatory frameworks and data privacy guidelines ensure that AI is harnessed for the greater good while safeguarding consumer rights.

In conclusion, the profound impact of AI on the power distribution utilities sector reverberates through every aspect of its operations. From demand forecasting to renewable energy integration, maintenance, and customer engagement, AI paves the way for a sustainable, efficient, and customer-centric industry. The journey towards harnessing AI's potential is a transformational one, shaping a future where power distribution becomes not only a technological achievement but also a sustainable cornerstone of societal progress.

## Ashwini Gajanan Chavan
### VNIT, EX-MSEDCL, EX-L&T

Ashwini is a power sector professional with deep ground level insights of the Industry. She is marketing enthusiast and a passionate dancer.