Technology Innovation: Advancement in Renewable Technologies

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Major challenges in RE asset management by Utilities in Power Sector

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	Shortage of technical manpower	***Non-Availability of manpower*** *to cover geographical spread of large utility*
	Dependence on third party vendors	***Over dependence on vendor and non-availability of internal monitoring capability***
	Non-maintenance of data records	*Utilities don't maintain records, and as a result,* ***entire work has to be carried out through field survey, lack of technology***
	Delayed decisions at Utility side	***Fast adaptability of changing technology landscape***
	Costly software	*COTS product can be expensive,* ***rely on newer technology***
	Lack of continual data updation	***In the absence of continual update****, legacy data become unreliable or unusable.*
	Non-availability of vendor support	***Contractual issues post AMC –****GIS and ERP*
	Integration of other Application	***Integration of COTS GIS and EAM*** *with spatial databases, web mapping services, OT and real-time monitoring systems.*

Functioning of the Asset Tool

Tool helps to manage asset lifecycle, track assets, monitor and report. Operational and technical functionality are being added as POC
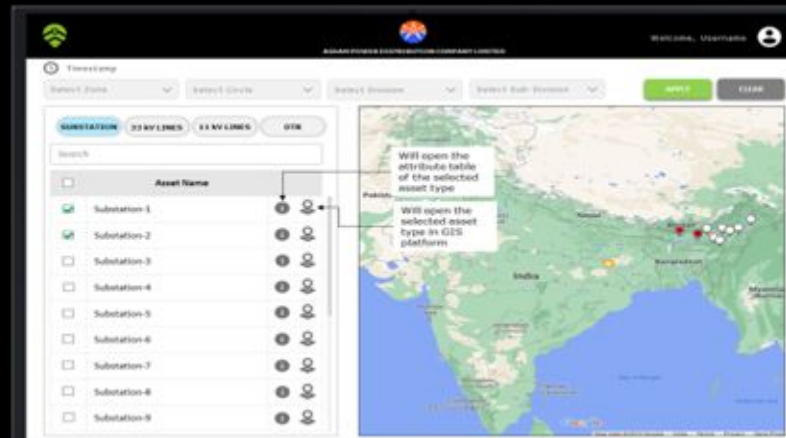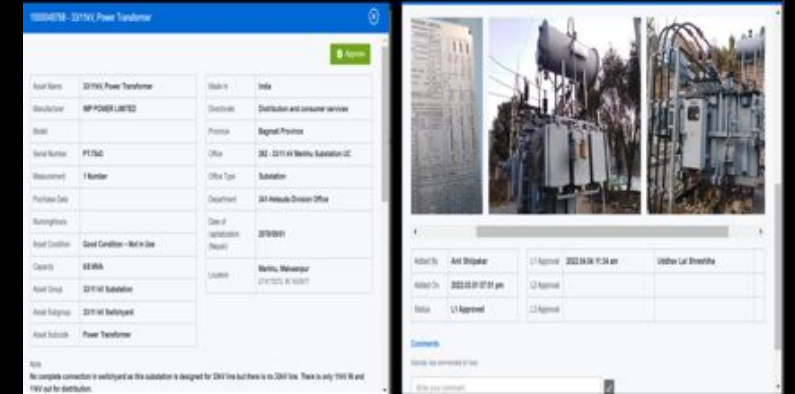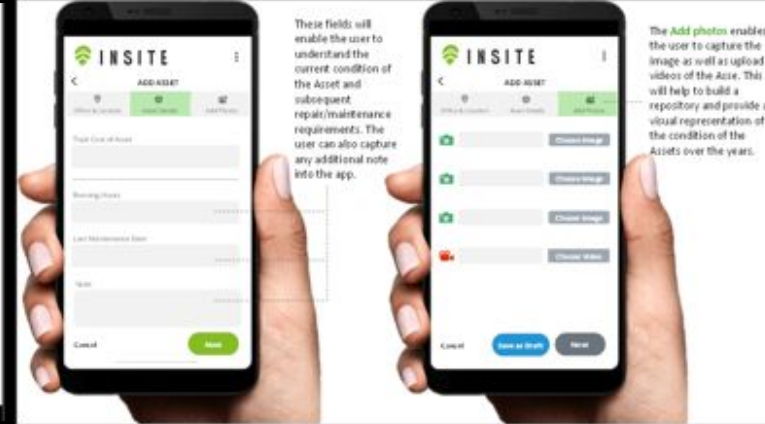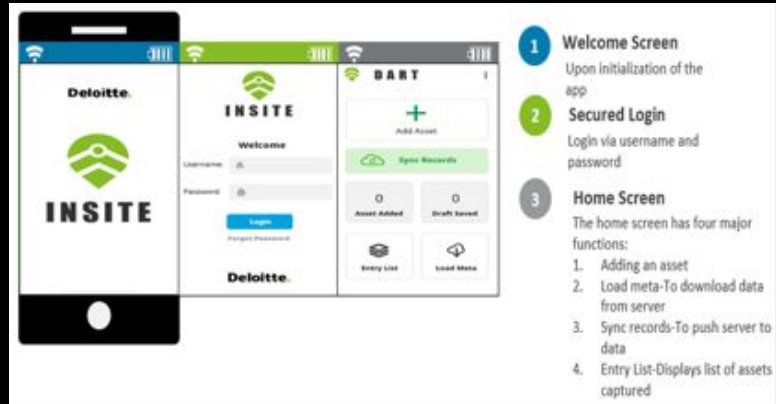
Transforming RE Resilience: From Prediction to Recovery

Leveraging the power of AI-ML and GIS to enable smarter prediction, decision-making, automation and recovery in the face of climate-induced disruptions

Pre-Disaster (Preparedness)

Risk Mapping and Vulnerability Analysis
Identify which assets are in high-risk cyclone/flood zones using geospatial overlays

Predictive Maintenance Asset Health Monitoring
Use IoT sensors + AI to detect weak/deteriorating assets before cyclone strike

Risk Zonation using Geo-AI Algorithms
Identify high-risk zones for cyclone damage using geospatial techniques

Cyclone Impact Prediction using AI/ML
Highly granular weather forecasts, enabling better anticipation and mitigation

Resilient Infrastructure Planning
Long-term planning to elevate, relocate, or reinforce assets vulnerable to climate risks.

Real-time Early Warning Integration
Integrate cyclone path forecasts with GPS-mapped assets for early shutdown/isolation

Post-Disaster (Recovery)

Drone/Satellite-based Damage Assessment
Automate detection of damaged poles, lines, and substations using computer vision models

Crew Dispatch and Route Optimization
Use GPS + AI to optimize field team deployment for faster recovery

Outage Impact Modelling
Analyze power loss patterns and estimate socio-economic impact using load + population data

Data-Driven Post-Mortem Analysis
Learn from cyclone event data to retrain ML models and improve future resilience planning

Automated Emergency Control
AI-driven switching or mobile substation activation during or immediately after impact

Resilience-Focused Investment Planning
Analyze cost of past damage to inform smarter capex allocation and future-proofing

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