



# POWERTHON



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# Revamped Distribution Sector Scheme

GoI and the MOP introduced “Revamped Distribution Sector Scheme - A Reform-based and Result-linked Scheme” with an outlay of Rs.3,03,758 crore with an estimated GBS from Central Government of Rs.97,631 crore.

- 1 Reduce AT&C losses at pan India levels to 12-15% by 2024-25
- 2 Reduce the ACoS-ARR gap to zero by 2024-25
- 3 Improve quality and reliability of power supply in distribution, leveraging advanced technologies

**This Scheme lays special emphasis on using Advanced tech to analyse bulk data generated through IT/OT devices in order to Increase operational efficiency & financial sustainability of DISCOMs.**

With the above focus there was a need to institutionalise a framework, for carving out key aspects of this envisioned concept.

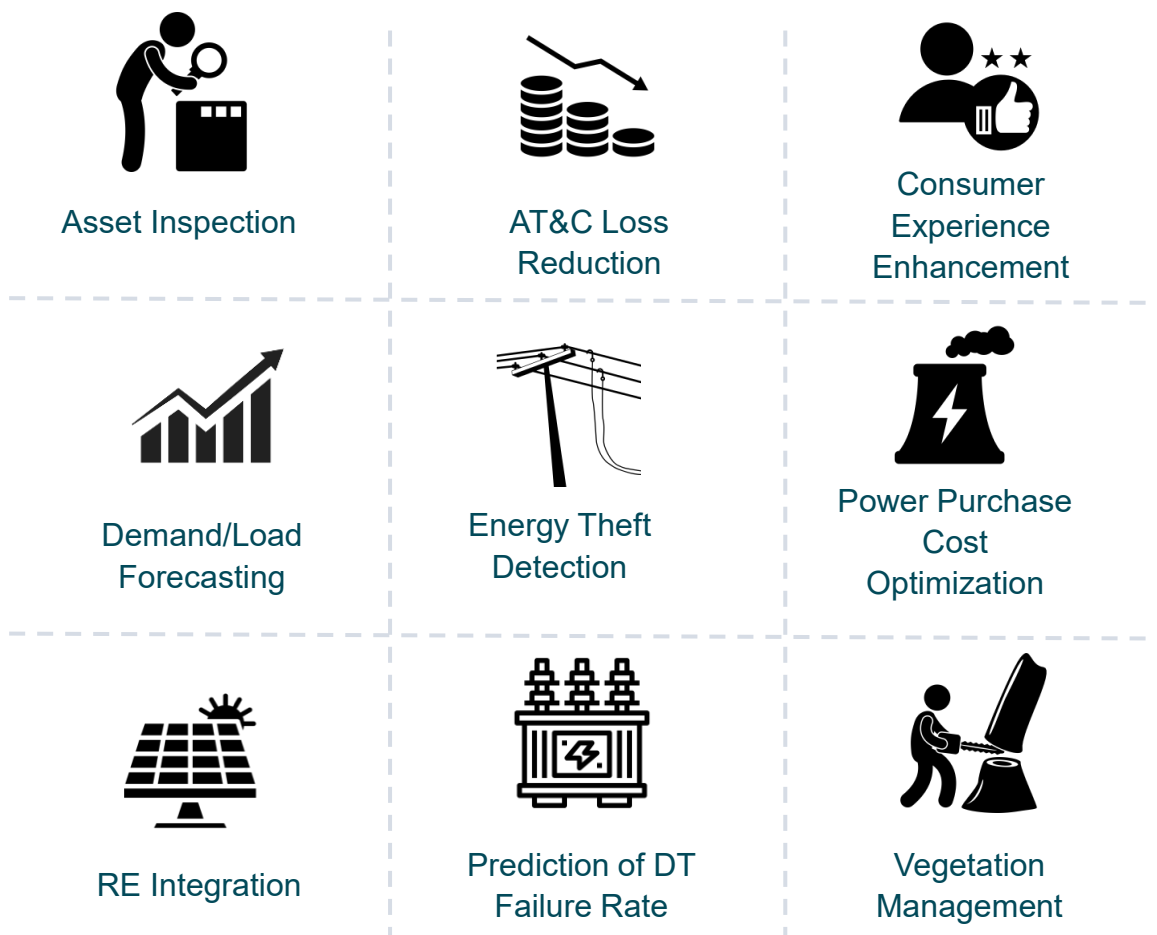
# Introduction to Powerthon-2022

The Framework to enable advance technologies in Power Sector was developed as a part of RDSS Scheme and was approved by the Monitoring Committee on 18.22.21. It thrusts with two-pronged strategy:

1. Leverage the existing network of technology Solution Providers (TSPs) to test and scale-up use cases at DISCOMs
2. Create power distribution focused incubator(s) that will provide for continuous innovation in the sector

For the former part, REC Limited was entrusted as a Designated Agency, which further collaborated with SINE IIT-Bombay for the programme

**As part of the first phase, 9 key problem areas were identified :**



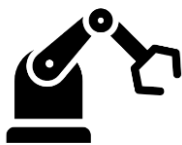
In order to onboard the TSPs, a competition “Powerthon 2022” was launched on 7<sup>th</sup> Feb 2022 by the Hon'ble Power Minister & NRE Sh. R.K Singh.

# Objective

The main objective of Powerthon is to Identify Technology Solution Providers (TSPs) with technology solutions capable to solve the problem statements as provided by various DISCOMs.

Everyone, Including Start-ups, Non-Startups & individuals, are eligible to participate in Powerthon & showcase their solution.

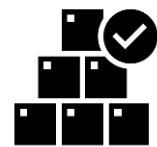
## Key considerations to the Powerthon-2022



Leverage advanced technologies to address key challenges faced by DISCOMs and enable continuous innovation



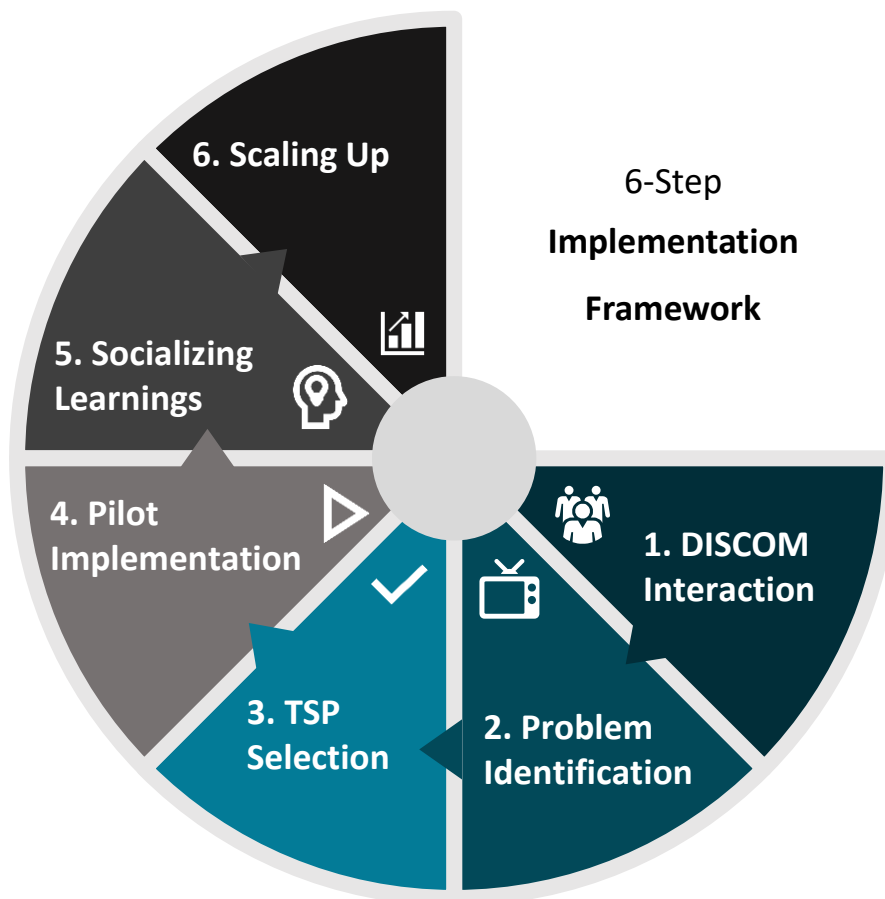
Comprehensive stakeholder interaction on problem statement deliberation



Detailed TSP selection process based on best fit solution for DISCOMs

# Key Activities Undertaken

- The programme was initiated based on the guiding principles of framework, followed by detailed programme guidelines and governance mechanism.



- Applications for Powerthon-2022 were opened from 15th Feb 2022 till 18th March 2022. A total of 275 applications were received which were checked for completeness, validity & duplicates and the eligible applications were evaluated by experts from SINE IIT-B & REC Limited.

- Next, TSPs were invited to give a presentation to a committee consisting of experts from REC, SINE & DISCOM nodal officers.
- Solutions were explained in detail along with Reports extracted from dashboards, final outcomes etc. After evaluation, 37 Applicants were invited for conducting a “Proof of Concept” with a DISCOM.
- PoCs were successfully conducted & reports were submitted by all the TSPs.
- After PoC, 16 Applicants (17 Pilot Implementations) were selected, in concurrence with DISCOMs to conduct a Pilot Run at their respective DISCOMs.

**The Pilot Run is currently underway, and applicants are in the process of implementing their solution at a Test bed area of the DISCOMs’ choice. The details of these 17 Pilots are provided in the upcoming section.**





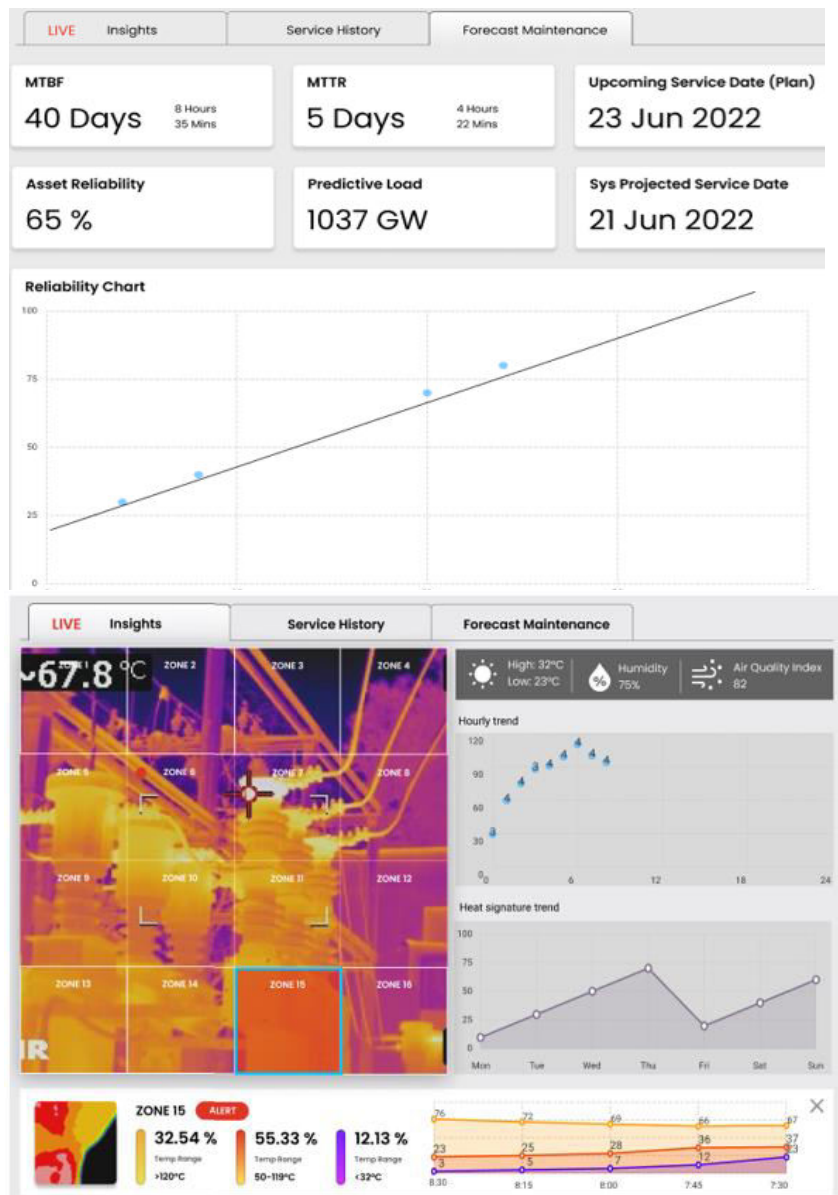
## Problem Statement

At present, the health condition of major equipment like PTRs and CBs in 33/11kV Substations are analyzed by DISCOM officials during the scheduled inspection through thermal imagery by visiting the substation physically at a 15-day interval, due to inability in carrying out live monitoring of the equipment. Therefore, DISCOM is interested in identifying and analyzing the health condition of the major equipment like PTRs, CBs in 33/11kV Substations through AI/ML solution via Drone based asset inspection.



## Solution Brief

- The solution uses High Performance Thermolmagers to capture Heat Signature of Critical assets at Pre-defined Intervals and detects anomalies.
- The solution also triages heat signatures, load, service history data and ambient information to provide service predictions





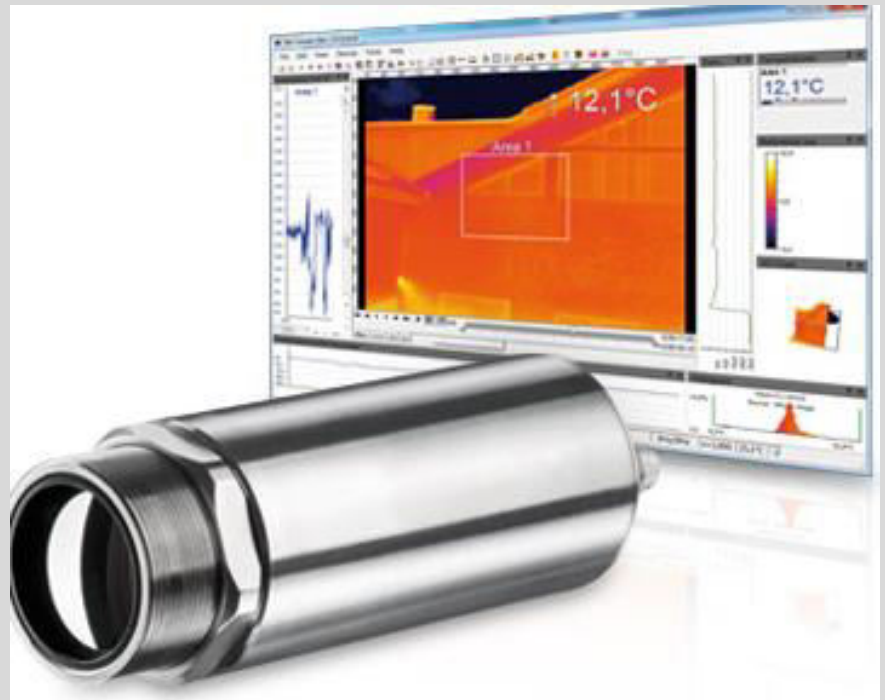
**Pilot Area:** Warangal, Telangana

**Associated DISCOM:** TSNPDCL



## Pilot Current Status

- Software (Web & Mobile) and Dashboard development for the Pilot Implementation completed.
- Hardware Procurement completed
- Integration of the Software with Hardware is in Progress
- Installation of the Hardware is planned for first week of Oct 2022



## Expected Outcome/Benefits from Pilot



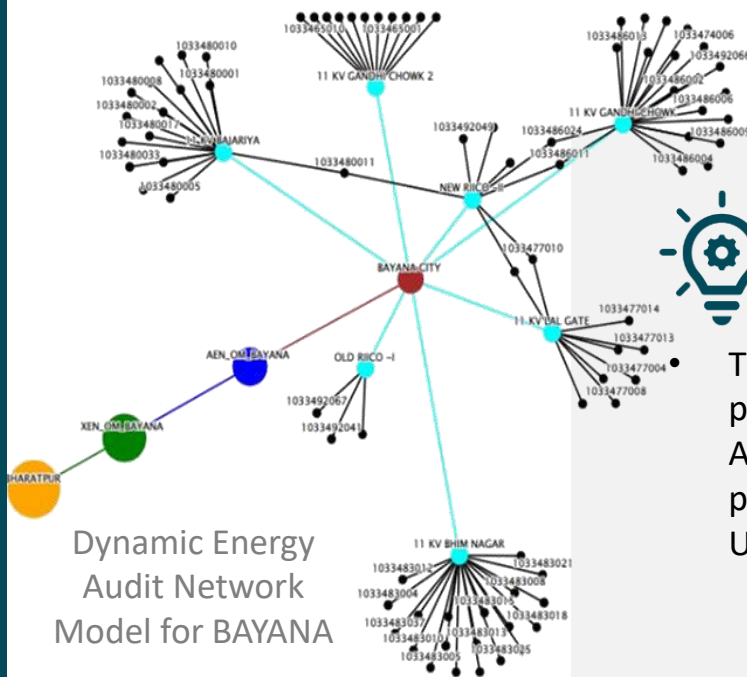
- Real-time Monitoring of Distribution Assets
- Reduction of Asset Monitoring duration from 15 days to 5 mins
- Asset Service Prediction – Transition from Reactive Maintenance to Predictive Maintenance
- Streamlined Asset Defect Management System
- Asset Reliability and Trend Analysis for increasing Asset Life
- Asset Maintenance Metrics (MTBF and MTTR) Tracking





## Problem Statement

Bayana, a town in Bharatpur district of Rajasthan, is a high loss pocket area. Bayan Town is part of Bayana Subdivision, having urban & rural customers. Bayana Subdivision has overall AT&C loss of 37.23% with population size of 48000. In Bayana Town, for all urban Consumer i.e., 8500 smart meters have been installed along with DISCOM is interested to study load pattern in the area (BAYANA Subdivision) to analyze loss reduction and detection of energy theft through AI/ML solution



## Solution Brief

The LR plus platform work on the principle of applying value-based AI&ML methodologies to enable the process of AT&C Loss reduction for Utility

- At the meter (improving on deviation and effecting meter reading & billing)
- After the meter (improving the payment recovery & cash flow recovery prediction)

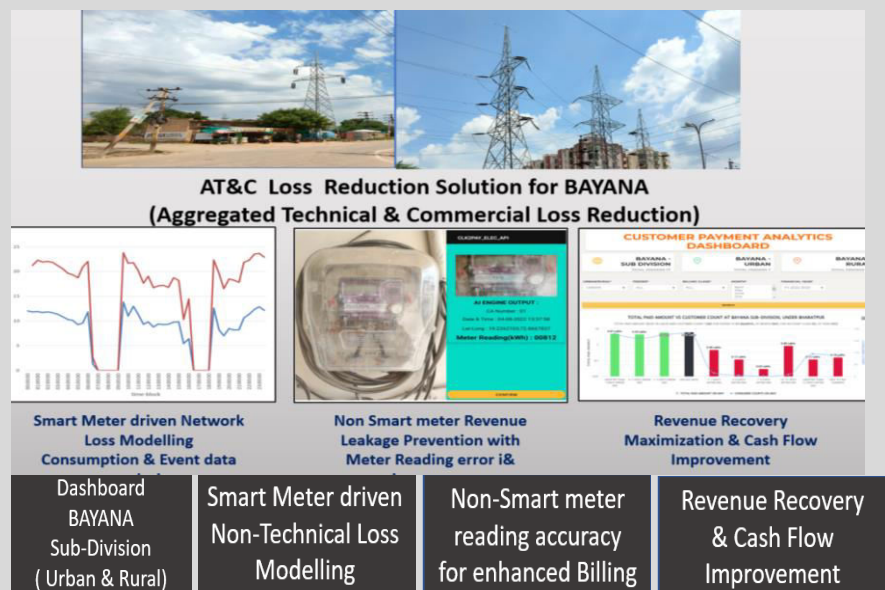
**Pilot Area:** Bayana

**Associated DISCOM:** JVVNL



## Pilot Current Status

- Project Baselineing completed considering data for July 2022
- Data from DISCOM for project provided as required
- Site inspection executed from REC
- Project Dashboard prepared
- Model data improvement in progress along with field data inputs
- JVVNL DISCOM support at all levels, SPOC at head office (Jaipur) and at Site (BAYANA)



## Expected Outcome/Benefits from Pilot



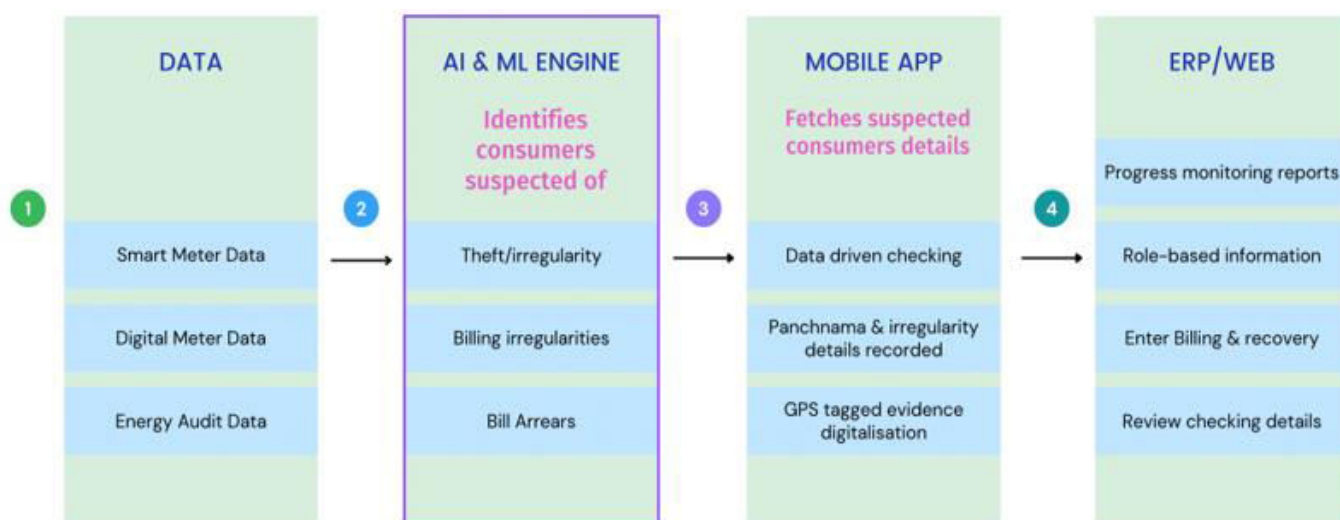
- Working on smart meter data for Urban consumer
- Energy Gap between feeder -DT and DT to consumers
- to derive bypass & service parallel consumer as an *ALERT* on the screen
- Model consumer energy trend i.e., domestic load with commercial pattern
- Working on non smart Rural meter i.e., digital meter, reducing error% in meter reading thus enhancing the billing propensity
- Working on Urban and Rural consumer, Revenue Recovery and defaulter prediction to enhance revenue





## Problem Statement

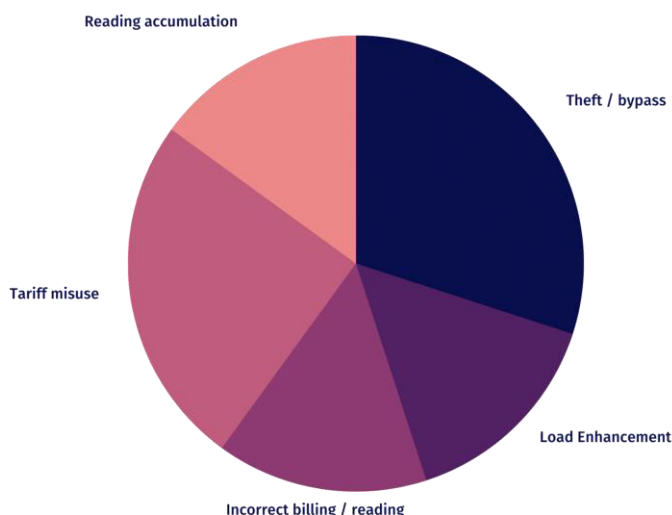
DISCOMs suffer from huge AT&C losses due to electricity theft / irregularities, billing inefficiency and collection inefficiency. Current theft/irregularity detection measures are ineffective as analyzing lakhs of consumers' data manually is impossible.



## Solution Brief

ELIS is an AI, ML, Digital Twin Tech, Cloud Computing, mobile app and be-spoke ERP based solution analyzing & processing more than 600 crore records in few minutes to help increase revenue & arrear recovery by accurate identification and inspection of premises suspected of irregularity.

### Irregularities



**Pilot Area:** Aloo Mandi, Zarib Chowki, Electricity House, Harrisgunj, Kidwai Nagar, Delhi Sujanpur

**Associated DISCOM:** KESCO



## Pilot Current Status

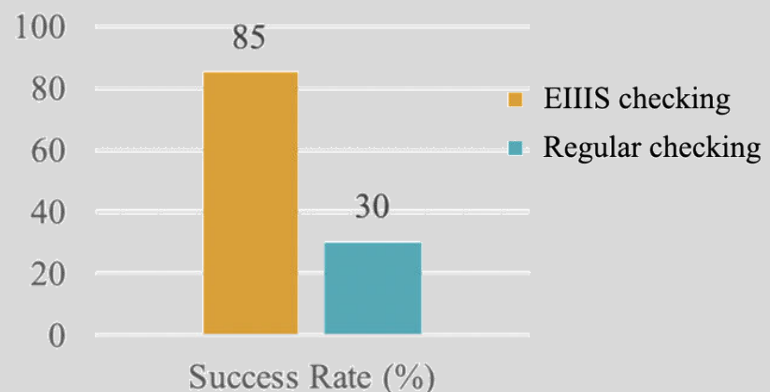
- Data received has been sanitized, analyzed and processed.
- Credentials are created.
- Our Cloud computing engine, AI & ML engine, App and ERP have been tested, hosted and ready to use.
- Deployed seasoned professionals with strong experience in Energy, AI, ML, ERP, mobile app and full stack development who have graduated from some of the top universities in the world.

**DISCOM**  
KESCO

### Pilot Area (Divisions)

- Aloo Mandi
- Kidwai Nagar
- Zarib Chowki
- Daheli Sujanpur
- Electricity House
- Harrisgunj

## Success Rate comparison (In %)



## Expected Outcome/Benefits from Pilot



Our solution eliminates need for manual identification of suspected consumers, leads to pin-pointed data-driven checking and helps enhance: -

- Number of checking, detection & regularization of irregularities.
- Success rate of checking and average revenue per detection of irregularities.
- Revenue due to regularization and load augmentation of consumers.
- Efficient use of logistics, manpower and resources.
- Billing efficiency, collection efficiency and reduce AT&C loss.

It can also help in efficient Power-purchase planning, plan for augmentation of power systems & DTR separation and reduce overloading of DTRs.







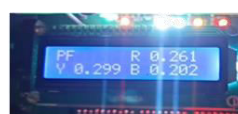
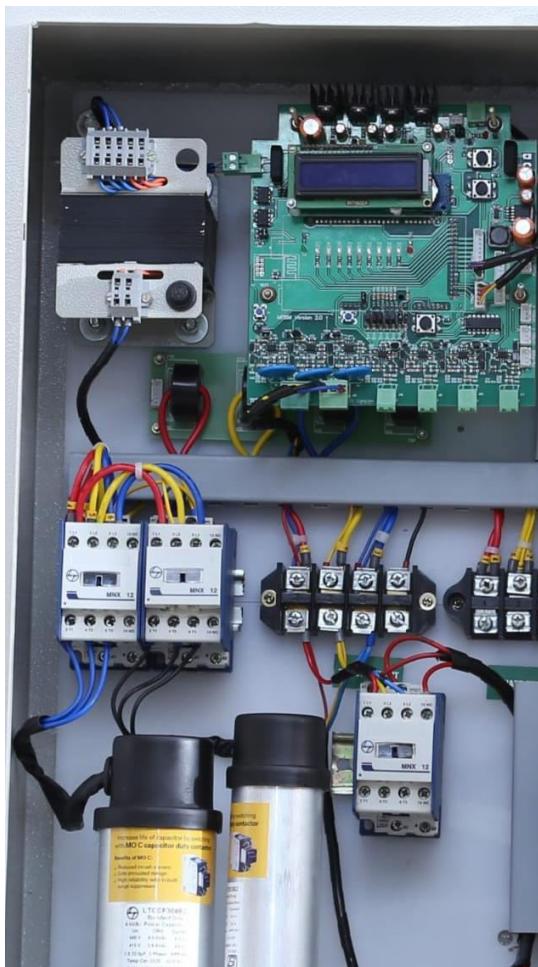
## Problem Statement

Lower Power Factor is prevalent in agricultural services with added disadvantage of intermittent unpredictable load conditions resulting in distribution line losses which require dynamic compensation at agriculture service connection and distribution transformer level. No energy accounting in agricultural services and hence feeders.



## Solution Brief

- Dynamic Reactive Compensation Unit (DRCU) improves power factor, low voltage conditions and technical loss reduction in both Service Connections and Distribution Transformers(DT).
- DRCU, Single/Two step capacitors for agriculture services and Multi step capacitors for DT is capable of monitoring agri loads, KVARH pumped into system, health of capacitor with 24X7 remote monitoring through server.
- With Active, Reactive Compensation, abnormality condition deduction & energy accounting in DT, cost savings will be millions Rupees for the Nation.



Before only 1 capacitor on

After both capacitor on





**Pilot Area:** KV Malikhedi Irrigation, Indore

**Associated DISCOM:** MPPKVVCL



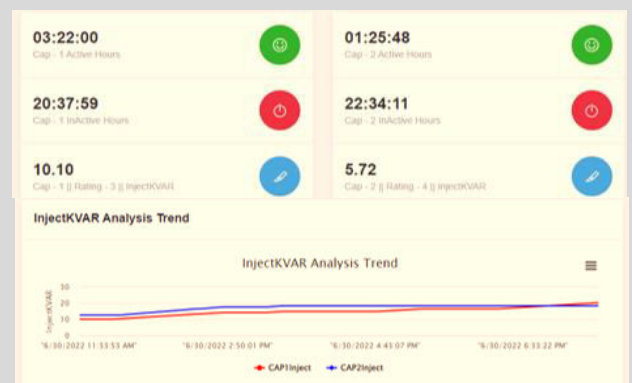
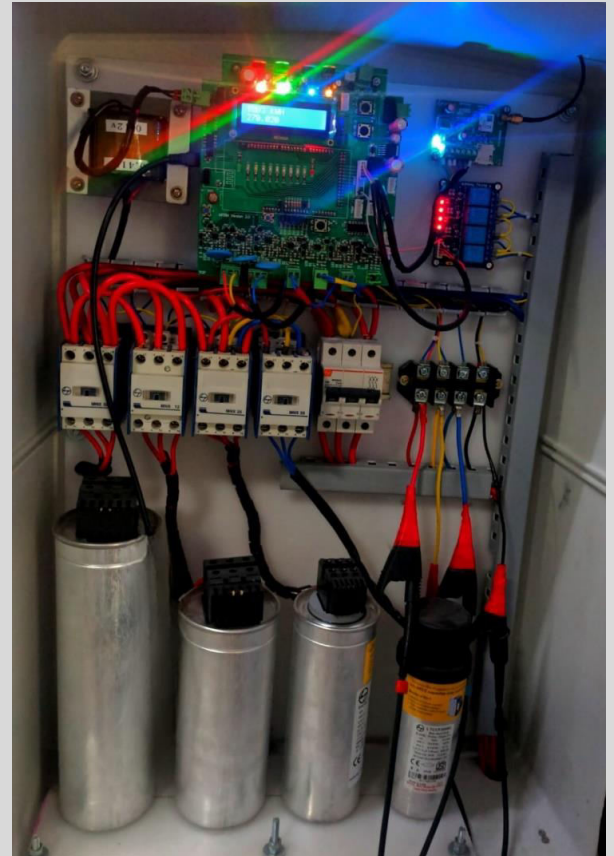
## Current Status

- Base line survey completed
- Data Collection from Baseline completed
- Meeting with DISCOM done
- Software development completed
- Hardware design completed & Implementation under progress



## Expected Outcome / Benefits from Pilot

- Improvement in power factor from 0.2 to 0.98 and average PF above 0.9
- Release of KVA capacity
- Reduction in Current drawl
- Reduction in  $I^2R$  losses
- Real time energy accounting
- Reduction in KVA
- Abnormal Current Deduction (Suspicious theft may be analyzed and deducted)
- Improved Efficiency of the System
- Long Term deployment benefits due to constant tracking of consumer behavior and monitoring of network leads to additional AT &C Loss reduction.



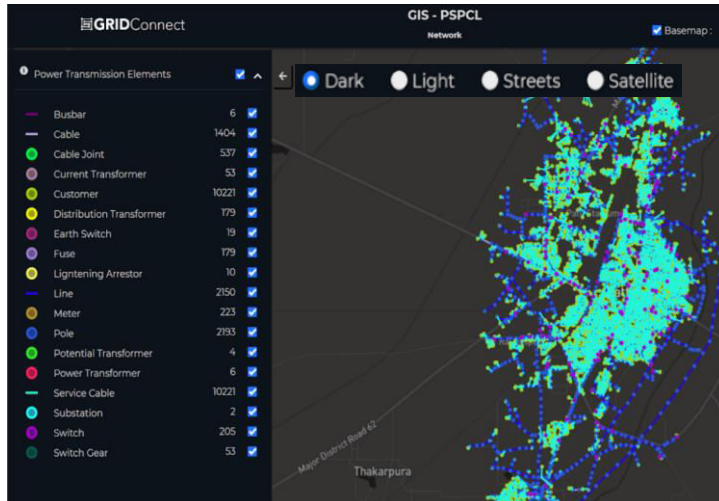
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53- III Cross, MKP Colony Main St, Ganapathy, Coimbatore,  
Tamil Nadu 641006, India

AT&C Loss reduction and Energy Theft identification by load pattern analysis using AI/ML solution in New Court Road Feeder of Patti Town area.

## Problem Statement



## Solution Brief

- REConnects' IoT hardware (**GRIDBox**) would be deployed at DT & Consumer level meters for collection of real-time data.
- GRIDBox data would be utilized by REConnects' AI Platform (**GRIDConnect**) for monitoring the DT & Consumer meters data on a near real time basis.
- GRIDBoxes data would then be analyzed vis-a-vis the periodic meter data provided by PSPCL for identification of losses.
- In addition to that, GRIDConnect advanced analytics (AI/ML) strength would be leveraged to further analyze the load patterns, consumer behavior, event profiling analysis, etc. for identification and reduction of AT&C Losses.
- GRIDBox internal control feature would then be utilized via GRIDConnect platform to remotely disconnect/reconnect the meters with suspected Losses.

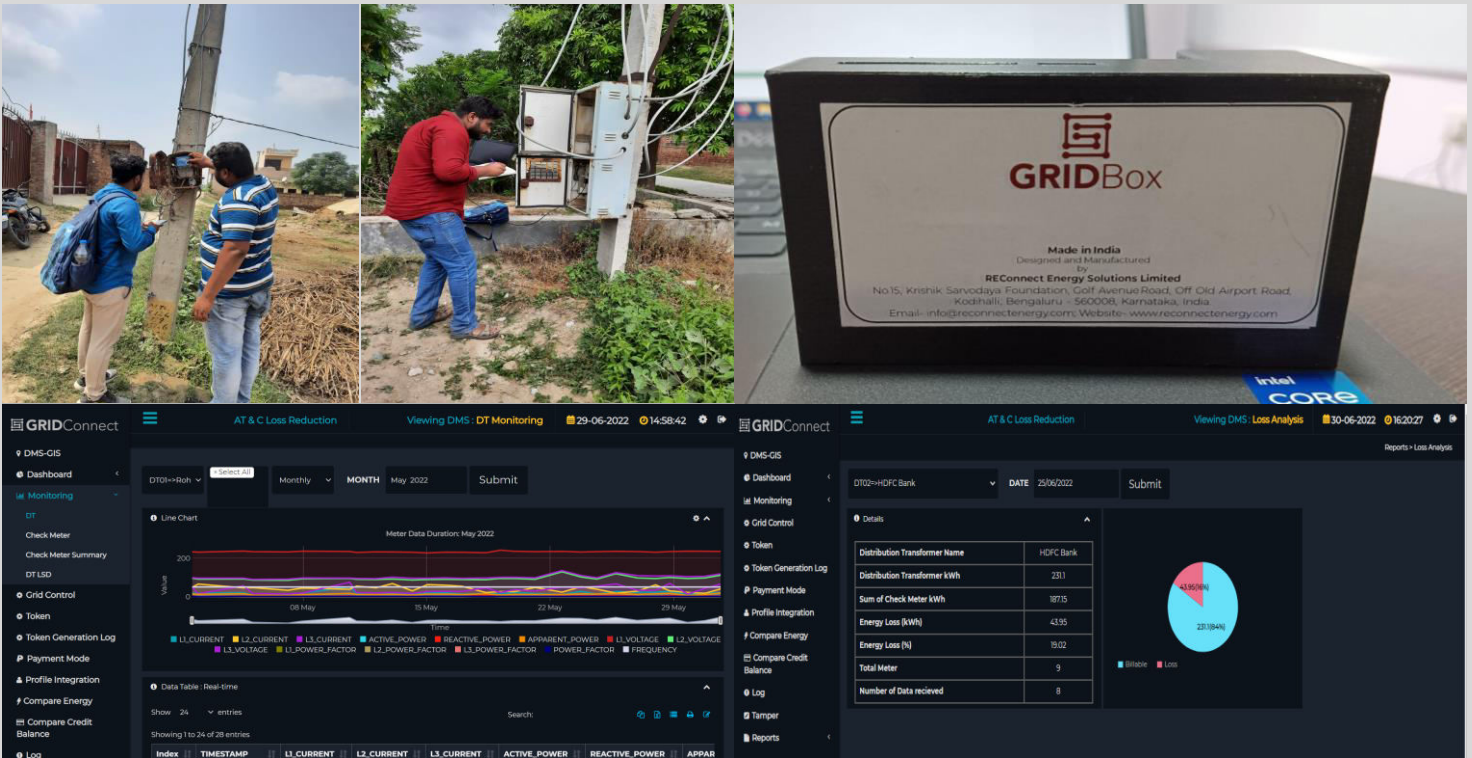
**Pilot Area:** Patti Town, Punjab

**Associated DISCOM:** PSPCL



## Pilot Current Status

- Field Survey & Baseline figures- **Completed**
- Data Monitoring IT Platform (GRIDConnect) development- **Completed**, updation of Geo-Tagging of assets - **Ongoing**
- Hardware (GRIDBox) procurement for installation- **Ongoing**



## Expected Outcomes from Pilot

AT&C Loss reduction & Energy Theft prevention and control by advanced analytics such as load patterns analysis, event profiling etc. at DT & Consumer Level



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+91- 80 5047 3388



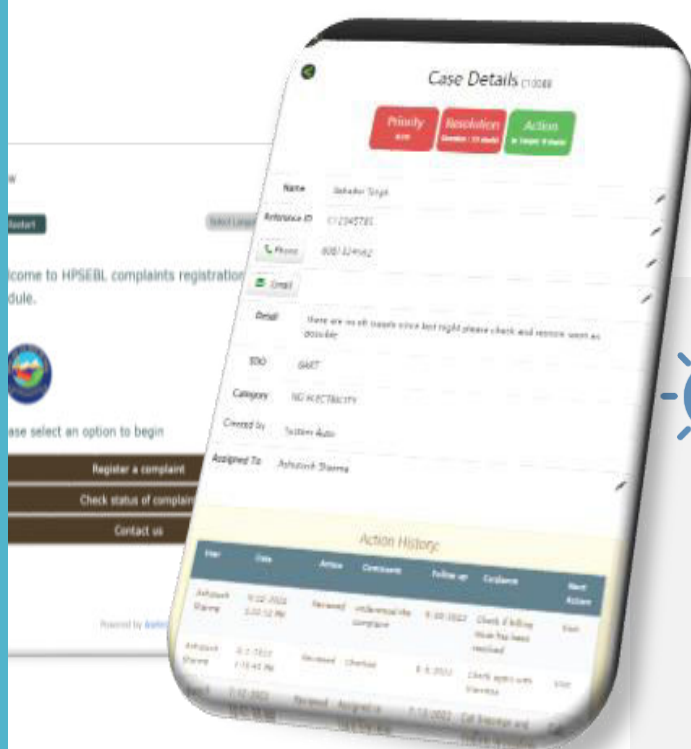
V K Kalyani Complex, #22, 7th Floor, Sankey Road, Bengaluru  
560020, Karnataka, INDIA



## Problem Statement



An AI driven robust, intelligent solution for Complaints Management. Automatic 3-dimensional intelligent scoring algorithms for priority, severity and sentiment. Advanced complaint classification, prioritization and routing. World class solution with Visual management, assignment matrix, automated load balancing and hierarchical reporting.



## Solution Brief

- The solution is a comprehensive AI platform with end-to-end complaint capture, classification, management and feedback.
- The system intelligently scores the complaint on multiple parameters and then presents a prioritised list to each user as per their ownership matrix. Real time command centre and visual reports for overall management and control.
- Device, browser and OS agnostic platform with 100+ language instant translation for complaint capture.





**Pilot Area:** Shimla Circle

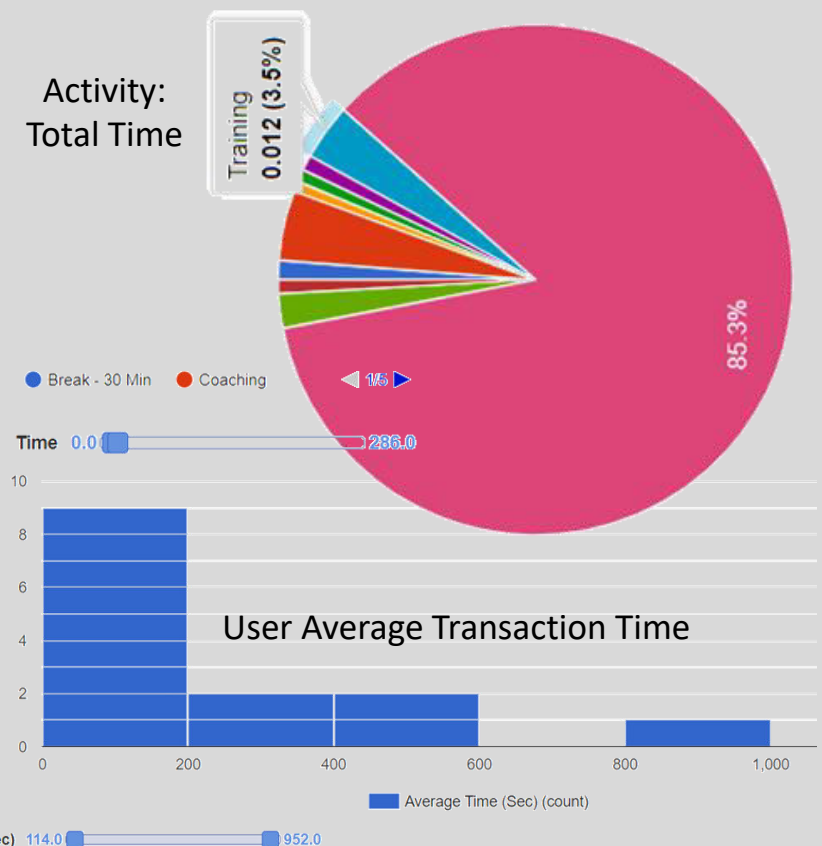
**Associated DISCOM:** HPSEBL



## Pilot Current Status

- The platform has been customised and in process of integrating input sources. The jurisdiction planned is Shimla circle with about 20 SDO's. The pilot would consolidate complaints across the call centre, online complaints, JE managed and Executive complaints.

Activity:  
Total Time



## Expected Outcome/Benefits from Pilot



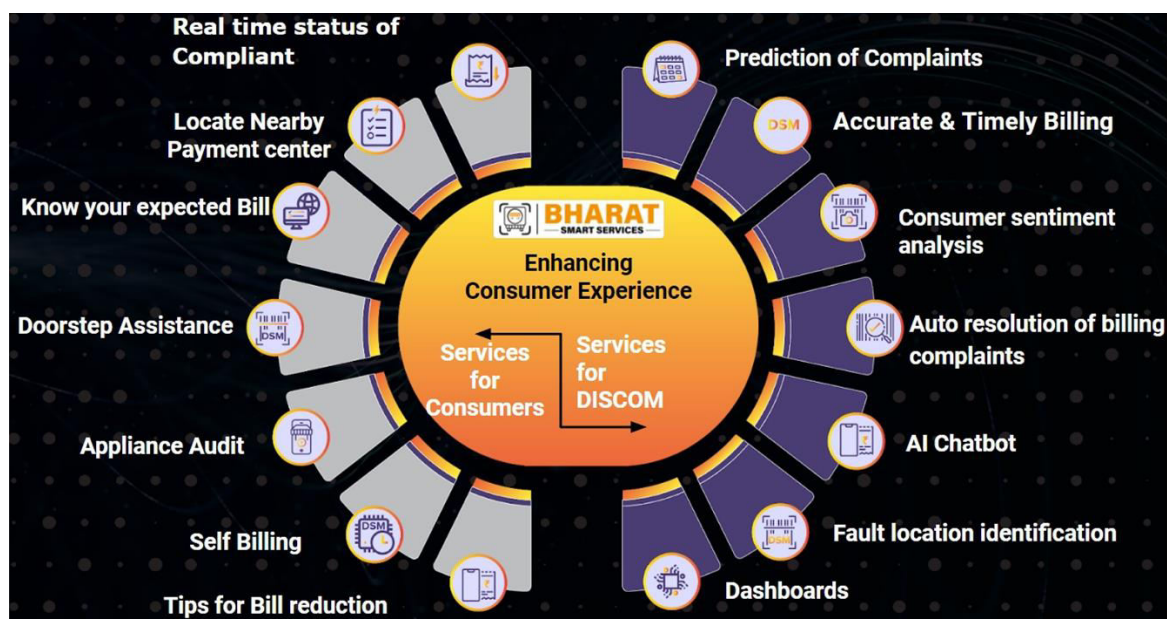
- AI NLP and ML algorithms for 3-dimensional complaint classification
- Automated real time priority calculation and routing assignment
- Enable 'Root Cause' analysis to proactively address issues
- Reduction in resolution time, visibility across levels
- Digital management of overall complaints process with visual highlighting of critical/delayed complaints and hierarchical access controls
- JE access with desktop and mobile app to update actions and manage workload digitally
- Root Cause and complete audit trail of all actions performed
- Post resolution automated feedback surveys with statistical analysis





## Problem Statement

Presently MPMKVCL have iSAMPARK-Customer care center, chatbot, whatsapp modes for consumer interaction. But despite of this, there are many issues like long on-hold time, incorrect tagging of complaints to officer/locations, Long resolution time. The DISCOM is looking for an effective implementation of AI/ML for automating & process simplification and predict the complaints for better planning.



## Solution Brief

AI powered solution for enhancing Consumer Experience & offering a comprehensive methodology for analyzing existing processes related to:

- New service connection, name change, load rationalization Meter Reading, Bill generation & distribution
- Payment options & Consumer communication
- Consumers complaint handling along with respective consumers billing data
- Other services for helping consumers on energy conservation

And Identify the processes to be simplified, automated by leveraging the technology services, empowering consumers with digital self services





**Pilot Area:** Bhopal City

**Associated DISCOM:** MPMKVVCL



## Pilot Current Status

- Data Access enabled through secured VPN
- Started development of Intelligent modules for
  - Billing Complaint Resolution process
  - Root fault Identification based on complaints data
  - Real time view of FoC gang movement for Consumers
- Developing the dashboards for
  - Insights on Billing
  - Insights to improve the payment collection



## Expected Outcome/Benefits from Pilot

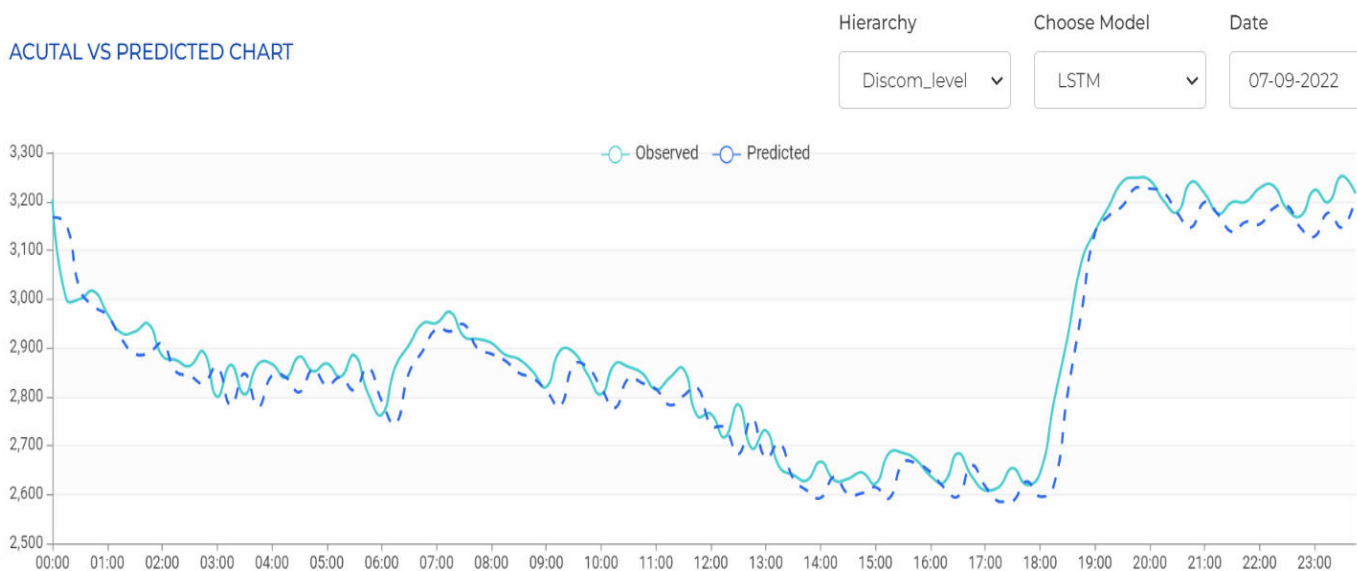


- Predictive Analysis for Predicting number of FoC/Billing complaints for proactive planning
- Enhanced Consumer Experience: Consumer sentiment analysis for improving satisfaction, Improved Billing Complaint handling process, AI Chatbot, Enabling a mechanism to regularly update consumers about their complaint.
- Meter Reader as doorstep assistant for New connection/load Enhancement, Home Audit services, Digital Self Services, Self Meter Reading & Billing, Know your expected Bill any day
- Develop consumer friendly bill format.
- Dashboard for monitoring Billing, Collection, Complaints



## Problem Statement

Precisely reasonable forecasting is essential to timely and economical demand and supply management. Accurate Load forecast models enable utilities to make appropriate power purchase decisions to efficiently manage energy distribution and plan load shedding event/ demand response programs. Utilities are looking for models that can forecast taking into account different areas, different weather patterns and special events.



## Solution Brief

- At Esyasoft, we have developed 15 min interval Load Forecast models based on statistical and Deep learning ML models (ANN, LSTM, SVM, SARIMAX...)
- The forecasts consider the impact of weather, holidays, and extraordinary social/religious events that can affect energy consumption and the seasonality of the demand load curve.
- Our solution includes an informative dashboard with various features, providing analytical outputs based on advanced AI/ML forecasting methods and statistical models.

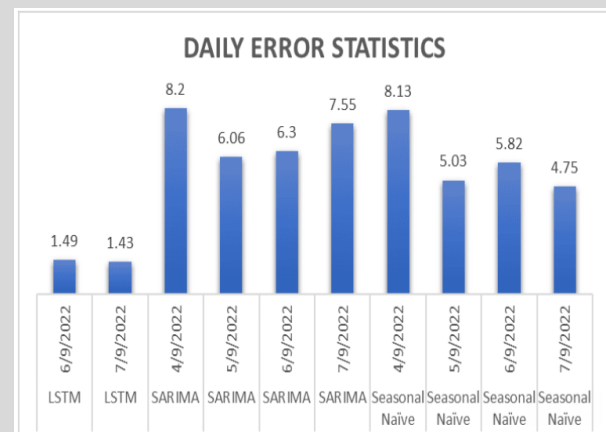
**Pilot Area:** MPPoKVVCL DISCOM

**Associated DISCOM:** MPPoKVVCL



## Pilot Current Status

- Received 15 min interval Load data of Jabalpur DISCOM
- Different models with varying time horizons & input variables developed
- Model Assessment is under process to test for variations with the actual load.
- Solution deployment and custom dashboards in progress
- Manpower Deployment completed
- Hardware & Software Procurement completed
- Load Forecasting Model Configuration and Solution development in progress



## Expected Outcome/Benefits from Pilot

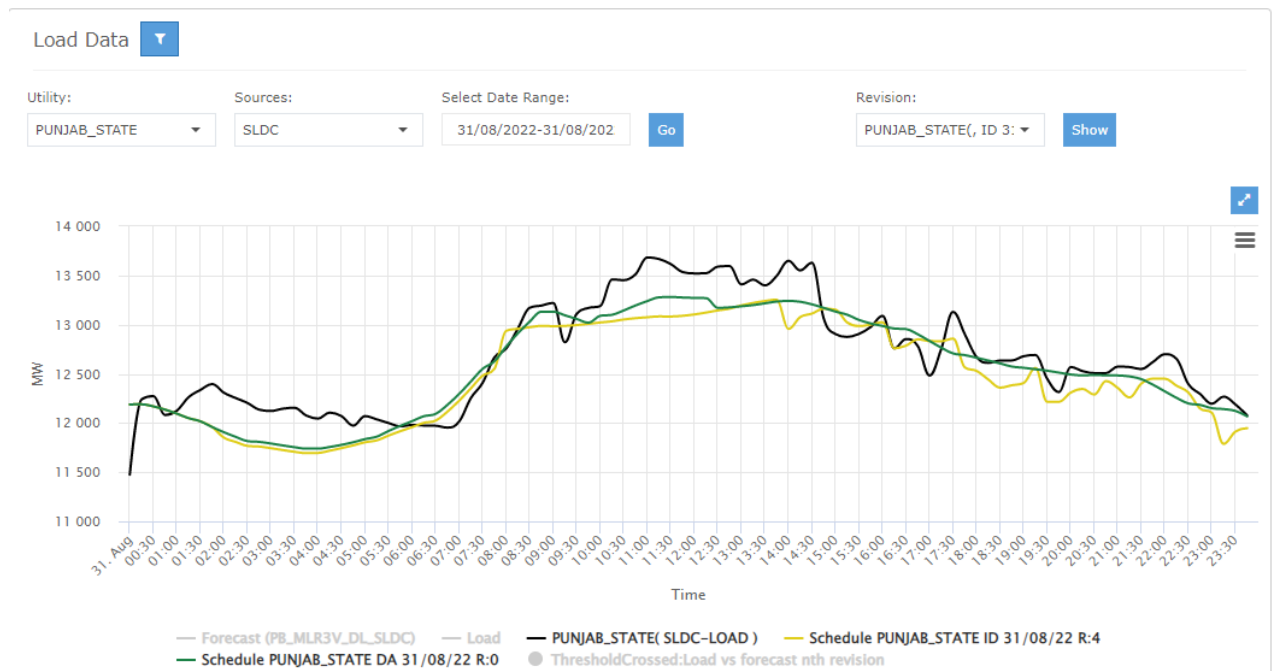
- Increase the model accuracy by using a higher time horizon of input data & parameter tuning for weather and day effects through the course of pilot.
- Our goal is to have accuracy **above 97.5%** on an overall day basis and minimize the error variation in different blocks.
- The portal increases the ability of users to interact with forecasts and deep dive into variations and load research. The system will track model performance and throw alerts in case deviation breaches specified limits. Also, various forecast models are being integrated so as to compare the model performance and aid in technological development.





## Problem Statement

DISCOM has informed that Demand forecasting is already being carried out by them through AI/ML solution in association with a private firm. However so far, there is no satisfactory outcome via same. Hence DISCOM envisage to explore solution for accurate demand forecasting, which can support in optimizing, streamlining and fine tuning the power procurement strategy. Accordingly, DISCOM proposes the above problem statement for potential AI/ML based implementable solutions.



## Solution Brief

- EPM provides the state of art power management with increased real time supply demand balancing, monitoring and ability to control and react to change for power utilities.
- It supports energy market participants and market operators to have an AI/ML based Load & RE Forecast and minimize their demand and supply gaps and provide complete portfolio management solutions which includes various mechanism to further augment their daily operational requirements.



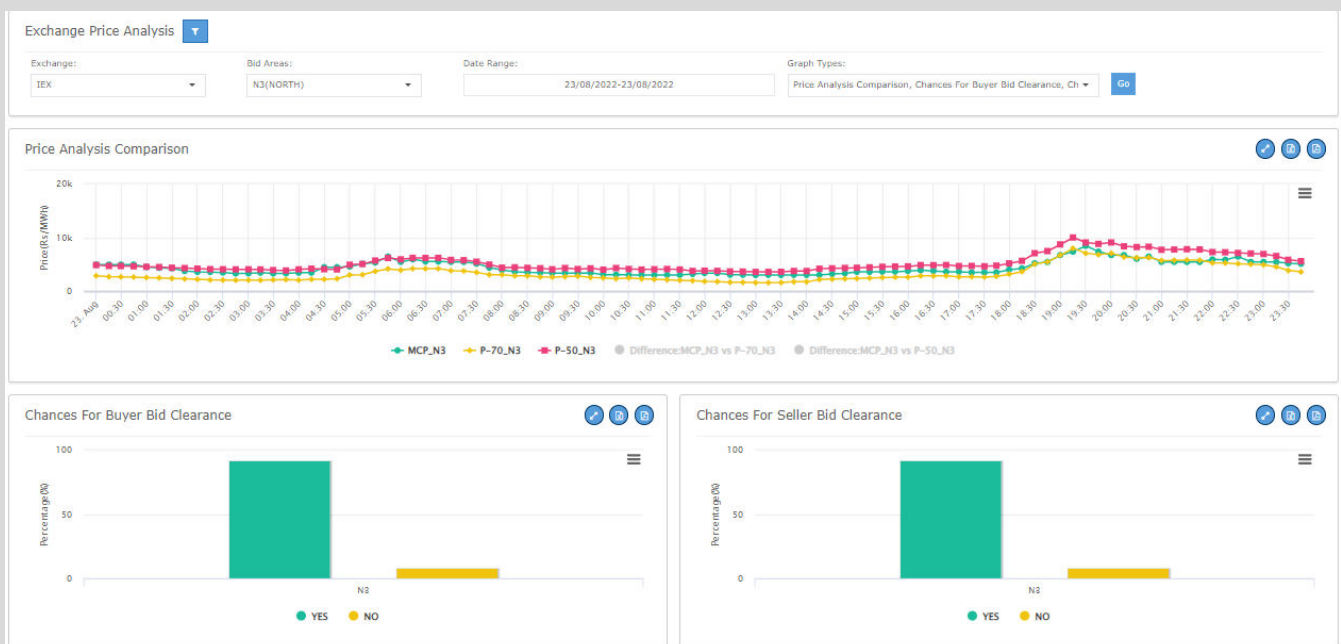
**Pilot Area:** Punjab State

**Associated DISCOM:** PSTCL

## Pilot Current Status



- Data Collection from Baseline and Meeting with DISCOM Completed
- System Configuration on Cloud Forecasting Model Configuration completed
- Day ahead/Intraday Load forecasting Report started sharing from 20-08-2022
- Daily Declare Capability/Contract Information shared by PSPCL from 27-08-2022
- Gap Analysis & Price Forecast shared by 50 Hertz to PSPCL from 28-08-2022
- SCADA data stopped by SLDC (PSPTCL) side from 06-09-2022, due to cyberattack
- SCADA data resumed by SLDC (PSPTCL) side from 28-09-2022.
- Forecasting and other services resumed from 30-09-2022



## Expected Outcome/Benefits from Pilot



- Successfully integrated with SCADA system
- Improve Load Forecast for PSPCL
- Accuracy improved by 1% on Day Ahead as compared to PSPCL's Forecast



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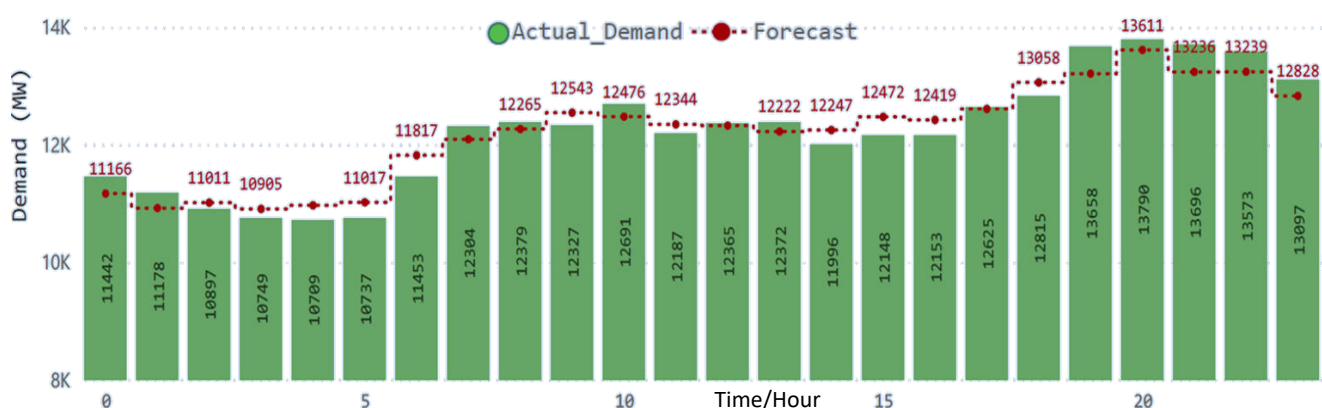


303, 3rd Floor, D-21 Corporate Park, Dwarka, Sector – 21, New Delhi - 110077



## Problem Statement

Accurate electricity demand forecasting is an essential component of decision-making in System & Utility Operations. Short-term Forecasts are used in control rooms for Economic Dispatch/MOD Scheduling, Trading & System Operation. Continuous advancement in Forecasting techniques, availability of custom AI/ML tools, better computing power, availability of quality DISCOM level data, and improved Weather forecasting have been pushing-up the load forecast accuracy threshold from time-to-time, with scope for better models' custom built for each power system, which is the aim of this project, for TN State.



## Solution Brief

- In short-term, Load is influenced by exogenous variables like Weather, Agri. Patterns, Holidays/Special Events and Outages.
- The complexity and non-linearity associated with demand renders the conventional statistical approaches ineffective.
- AI/ML approaches, though have been successful, need constant training & calibration.
- Considering diverse demographic, geographic, demand mix and climactic variations across States in India, EMA adopted a custom model design & development approach by combining various models suited for time-of-day, seasons, weekdays, etc, developing custom ensemble approaches suited to a State / Discom.





**Pilot Area:** Tamil Nadu State

**Associated DISCOM:** TANGEDCO



## Pilot Current Status

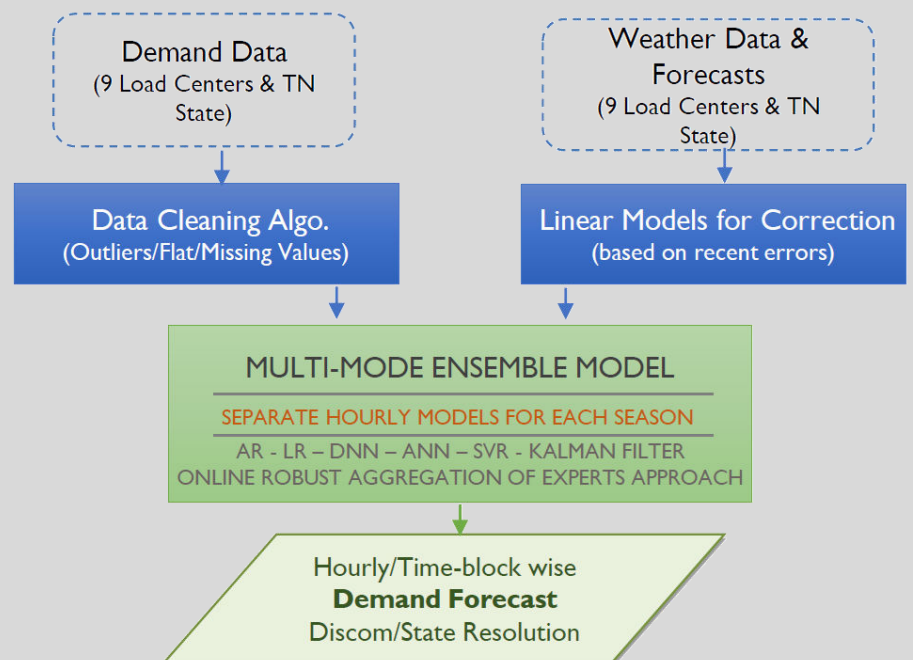
- EMA has developed a bucket of approaches, in the PoC phase, for Short Term Load Forecasting of Tamil Nadu State, using historical load center-wise demand data of 2017-22.
- Demand and Weather data integration & automation is completed, with weather data sourced by EMA from identified reliable service providers, for relevant nodes of TN State.
- Live Forecast generation, on Day-ahead & Same-day basis, started in the last week of Sep-2022, and AI/ML model(s) calibration is continuously ongoing for higher accuracies.



## Expected Outcome from Pilot

- Higher accuracy in very short-term demand forecasting, both on day-ahead and same-day basis, with error below benchmark
- Aid the Utility in efficient generation planning, trading & DSM management
- Procurement cost reduction, as a by-product of accurate forecasting

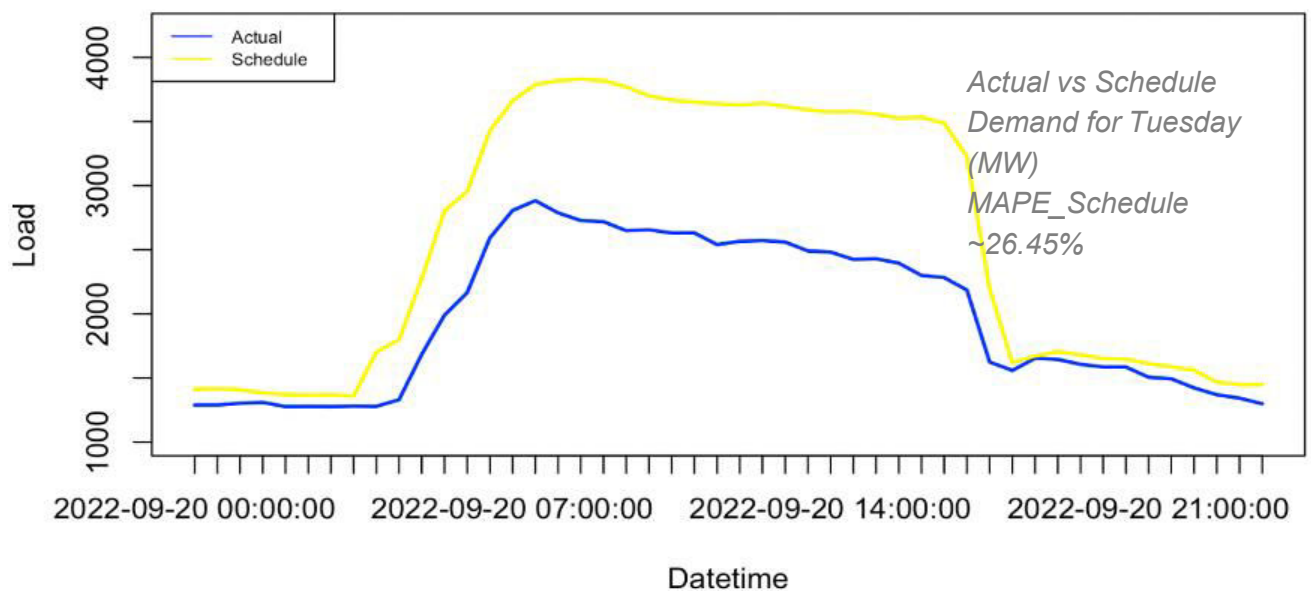
### DEMAND FORECAST APPROACH FOR TAMILNADU





## Problem Statement

Telangana State Northern Power Distribution (TSNPDCL) currently uses statistical methods such as trend method and end user method for energy sales forecast and scheduling energy requirements. The forecast through this method is inaccurate (figure below) causing mismatch between actual and scheduled demand which can result in issues with power procurement, supply shortages and forced outages ultimately higher price for consumers



## Solution Brief

- We used R statistical programming & XGBOOST (Extreme Gradient Boosting) machine learning package to forecast TSNPDCL's demand. The model was built on the historical 5-year TSNPDCL actual demand data and incremental daily demand data accessed using an API.
- We used Feature Engineering on extracting time stamps, maintenance schedules, consumer profiles, consumer counts, holidays and using GIS coordinates to input external features such as weather data into the model.
- The historical demand data was split into 20-80% for testing and further learning for the machine learning algorithm.



**Pilot Area:** Northern Telangana

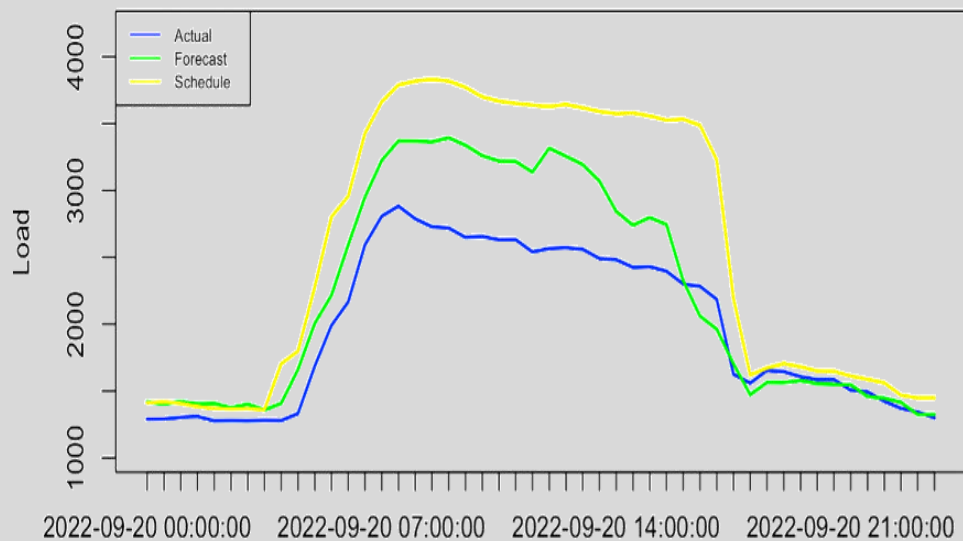
**Associated DISCOM:** TSNPDCL



## Pilot Current Status

- The model predicted the demand forecasting for the entire TSNPDCL serviced area for short term day ahead forecast, weekly forecast and longer term 1 month and 1 year forecast.
- In process of validating the data, improving the forecasting accuracy and developing a cloud-based visualization tool

Actual vs Forecast Demand for Tuesday ( MW ) MAPE\_PRED ~ 12.64 % MAPE\_SCHEDULE ~ 26.45 %



## Expected Outcome/Benefits from Pilot



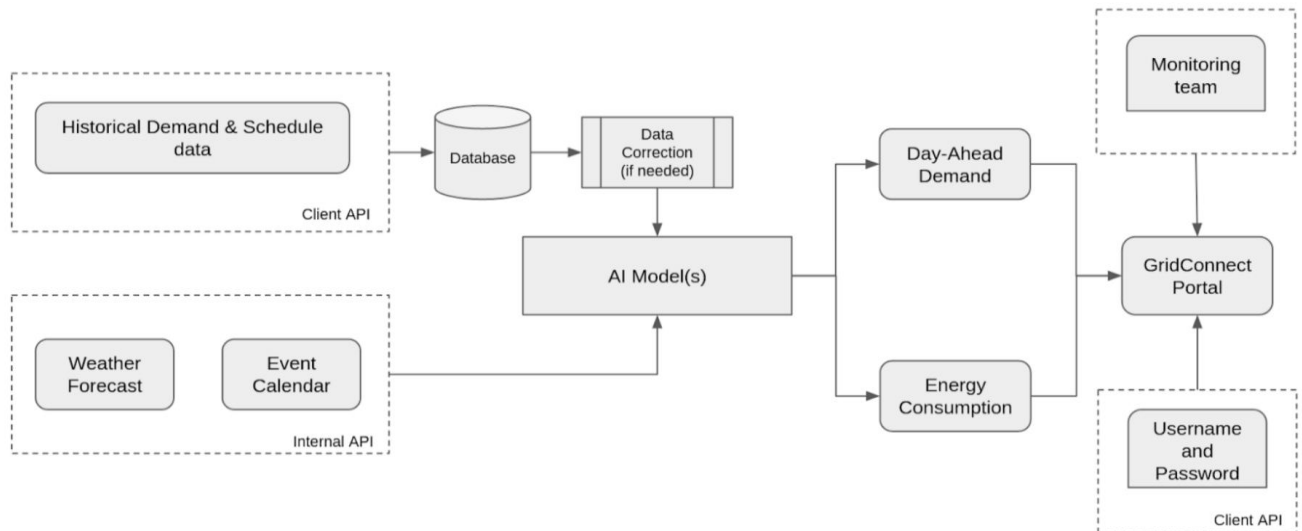
- Improvement of Daily forecast compared to TSNPDCL's statistical driven scheduled load by up to 50% reduction (figure below) of Mean Absolute Percentage Error (MAPE). MAPE provides the difference between the actual and forecast expressed as percentage mean over a 24-hour period
- We also expect the weekly, monthly and yearly forecast to improve MAPE up to 7.5% for weekly, 12% for monthly and 14% for yearly
- Further improvement is possible because of learning process and as new data is input to the model continuously through API
- TSNPDCL and other distribution companies can utilize such as an accurate short-term demand forecast for more efficient power purchasing with fewer penalties and long-term demand forecast for optimal network planning



## Problem Statement



Demand/Load Forecasting using AI/ML to aid in Power Purchase Cost Optimization for DISCOMs.



Workflow depicting the demand forecasting system



## Solution Brief

- A combined solution consisting of weather sensitivity analysis, data-based pattern recognition & mapping of operational parameters
- Customized configuration of regional Numerical Weather Prediction (NWP) models incorporating multiple sources of global weather forecast data along with operationally tested & deployed Deep Learning models for Short-term and Medium-term Load Forecasting will be used to forecast the demand

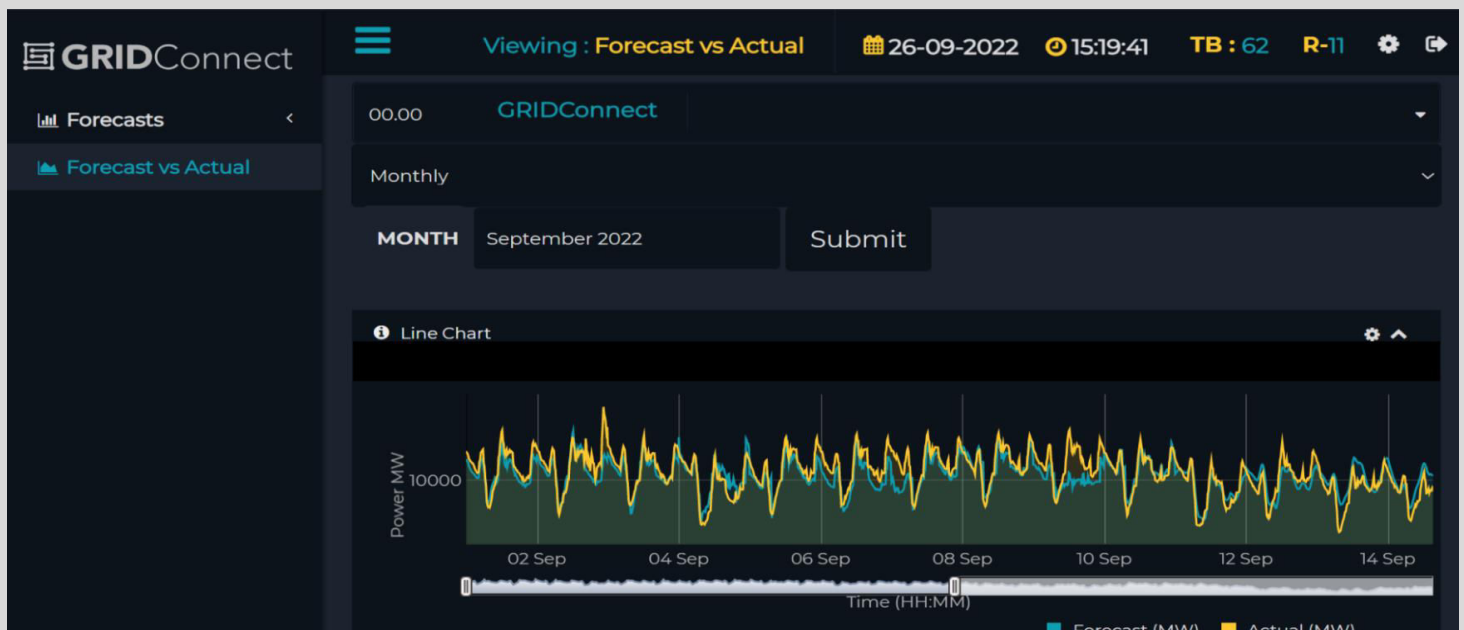
**Pilot Area:** Uttar Haryana

**Associated DISCOM:** UHBVNL



## Pilot Current Status

- AI Model development for Demand Forecasting- **Completed**, further updation in models based on circle-wise data is ongoing
- Weekly & Daily Forecasts for Power Procurement- **Generated** using AI models and is being shared for power procurement decision making
- GRIDConnect Platform development for Forecast monitoring and sharing- **Completed**



## Expected Outcome/Benefits from Pilot



- Accurate and Automated Intra-day, Day-Ahead, Week-Ahead, Month-Ahead and Seasonal Demand/Load Forecasts
- Power Purchase Costs Optimization, Improved Power Procurement Planning resulting in significant cost savings.



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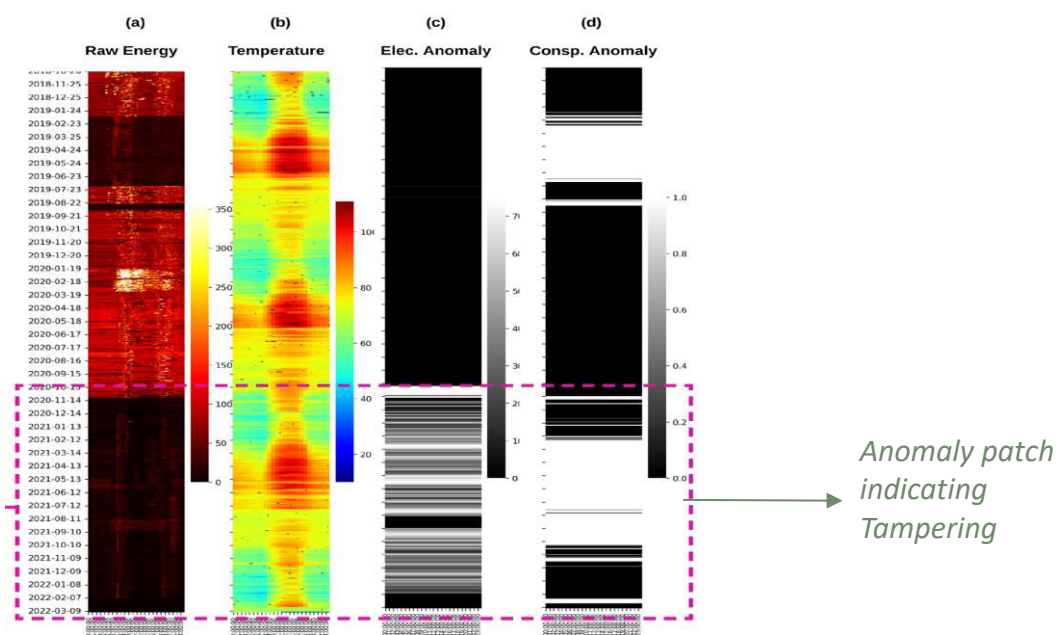


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## Problem Statement

The Smart & Interval Meters record all technical events, with more than one event occurring in a single meter in most cases. While some events supplement each other, some may be unrelated. Since these are analyzed manually in isolation by the technical team, an AI based system could help in assessing the severity level of the case with simultaneous multiple events in terms theft probability.



## Solution Brief

- Bidgey's patented Load Disaggregation technology (appliance wise break up) and AI based algorithms collate smart meter AMI data of consumption, electrical parameters and tamper events to identify anomalies in consumers' consumption behavior with assigned score for probability of their engaging in meter tampering, meter bypass and/or tariff misuse (commercial activity on residential tariff).
- Pinpointed actionable leads with estimated energy loss help the Utility increase their billing efficiency while scalability, speed & efficiency create operational benefits.





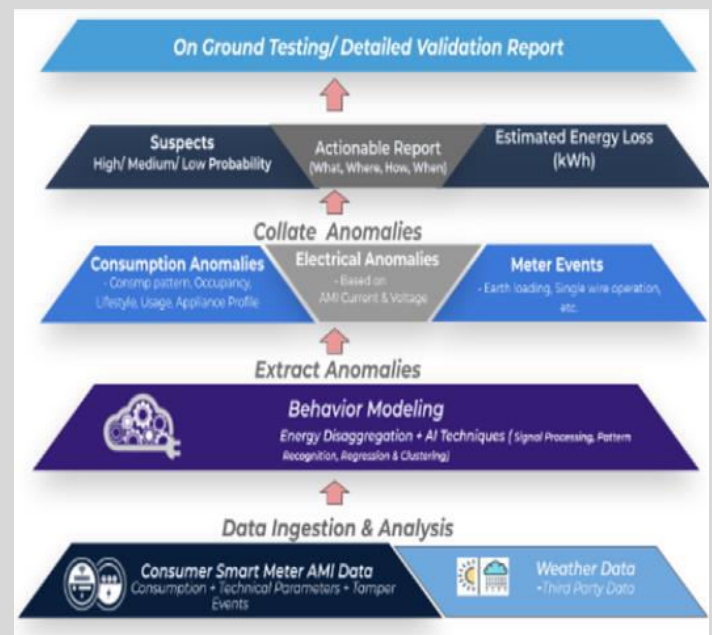
## Pilot Area: MPPoKVVCL Smart Meter Consumers

**Associated DISCOM:** MPPoKVVCL



### Pilot Current Status

- Test run on 1000 consumers done, detailed report of 28 high probability & 22 low category suspect cases shared with MPEZ.
- Almost ~50% inspections done with around 100% booked in tariff misuse, technical faults resolved in 35% and few cases due for assessment.
- Pilot baselining done, & data exchanged
- Workshop for feedback report done, another to be held for vigilance team
- Further development of AI model awaits GT cases with MPEZ's historical AMI data



*Bidgely's Approach*

### Expected Outcome/Benefits from Pilot



- Increased Billing Efficiency - 360 deg view of anomalies to plug revenue leakage due to meter tampering, meter bypass, tariff misuse, technical faults (earth leakage, missing phase, CT/PT related, etc.)
- Operational Savings with fast & efficient data churning irrespective of the volume, reduced man hours for analytics, reduced volume of cases to be processed, field trip costs, etc.
- Long Term deployment benefits due to constant tracking of consumer behavior and monitoring of network issues leading to reduced AT&C loss levels.





### Problem Statement



Power Purchase Cost accounts for ~80% of the total costs borne by the DISCOMs. Optimizing the same has been an area of concern for the DISCOMs as it factors in a multitude of historic and projected data points like demand, tied up capacity, energy, fixed charges, must-run plants etc. AI/ML can be leveraged by using historic data as well as forecasts to automate the power purchase cost optimization process and formulate a framework to repurpose existing power purchase portfolio to identify high-cost or underutilized low-cost plants. This will help DISCOMs reduce power purchase costs and bring down electricity tariffs.



Supply Profile

Demand Forecasting

Market Data

**Procurement Optimization**

Optimization Analysis

Dashboard

Day Ahead Planner

Reporting

Block: 47

Time: 11:38:13 AM

Date: 23 Sep 2022

#### System Recommendation

Market Recommendation				
Blocks	Time	Action	Quantity	Price
51	12:00-12:15 PM 10/07/2021	NO ACTION	-	-
52	12:15-12:30 PM 10/07/2021	SELL	48 MW	₹2350/MWh

Offtake Recommendation						
Blocks	Time	Plant Name	Current Schedule	Variable Cost	Action	Quantity
51	12:30-12:45 PM 19/02/2022	Talcher TPS	300 MW	₹ 1810/MWh	Increase	40 MW
		Vedanta	230 MW	₹ 1920/MWh	Increase	60 MW
52	12:45-1:00 PM 19/02/2022	Talcher TPS	340 MW	₹ 1810/MWh	Increase	20 MW

☒ Copy System recommend decision

#### Decision Window

Market Decision				
Blocks	Time	Action	Quantity	Price
51	12:00-12:15 PM 10/07/2021	NO ACTION	-	-
52	12:15-12:30 PM 10/07/2021	SELL	48 MW	₹2350/MWh

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### Solution Brief

- Our power purchase cost optimization solution is an end-to-end automated digital tool that will support DISCOM in minimizing its power purchase costs through system-generated purchase/sale plans for both short and longer terms while meeting the regulatory mandates of RPOs.
- The solution leverages advanced AI/ML technologies to understand demand, supply, & cost patterns from data & recommend the most optimal portfolio of sources to purchase/sell power in short and long terms.



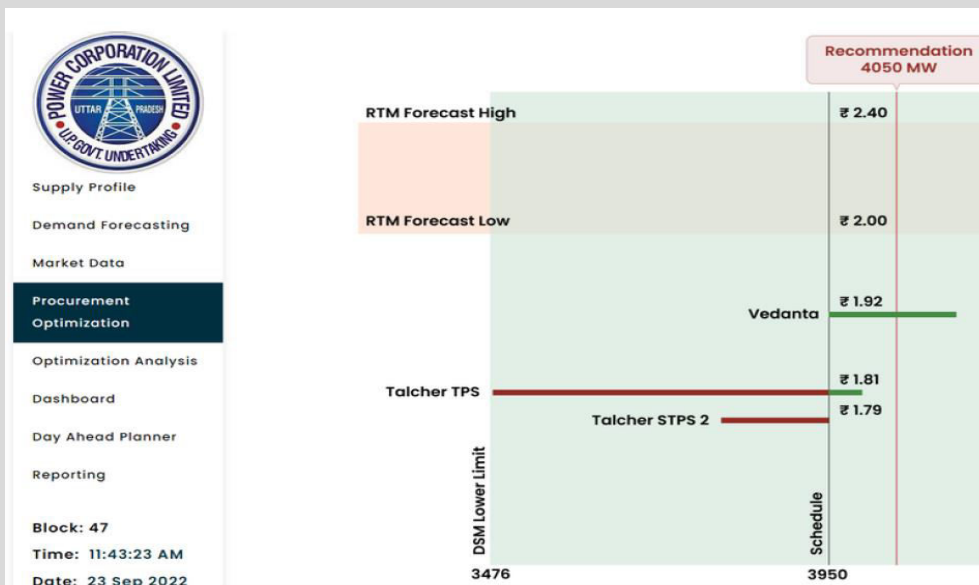
## Pilot Area: Power Purchase Cost Optimization

**Associated DISCOM:** UPPCL



### Pilot Current Status

- We visited the UPPCL office and met MD, DISCOM Nodal Officer, and the procurement team on 23rd August to kick off the pilot phase.
- Discussed with procurement team to understand existing power procurement systems and processes, developed process flow diagrams of current procurement setup and shared the pilot scope document with UPPCL for concurrence.



- Deployed manpower and started work on the activities under pilot scope.
- Developing RTM vs DAM recommendation engine to provide optimal short-term procurement recommendations.

- Optimized power procurement, in the short, medium, and long-term leading to lower purchase costs
- Complete automation of short-term power procurement process leading to higher efficiency and lower manpower requirement
- Intelligent decision support system for faster and optimal decision-making for short-term procurement
- Integration with the trading platform to seamlessly place bids and receive market information round-the-clock



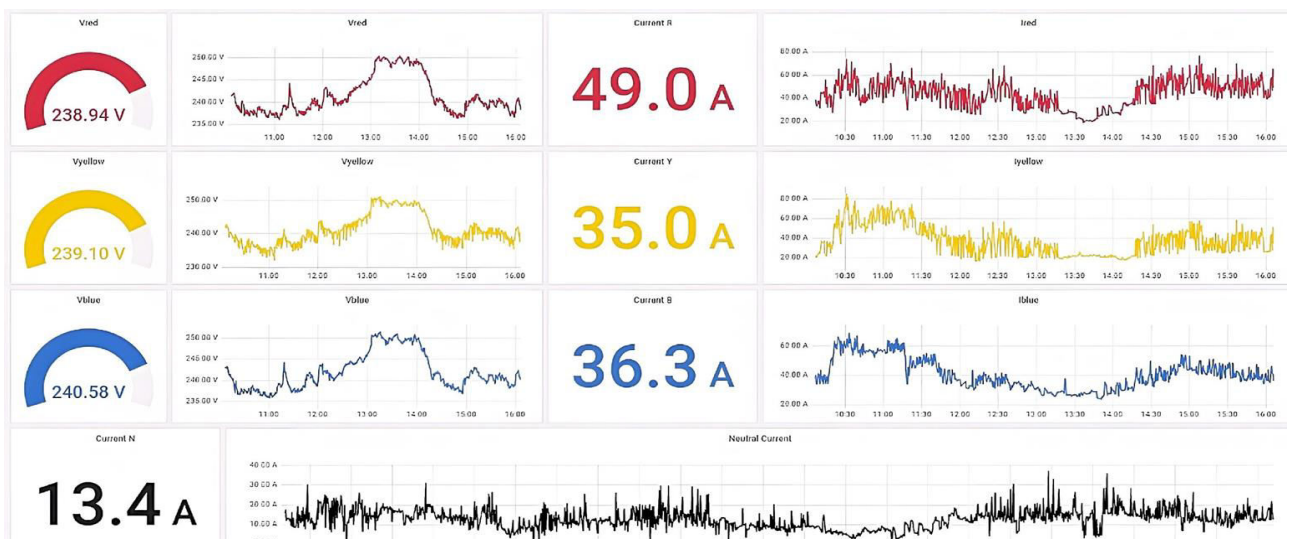
**Expected Outcome / Benefits from Pilot**





## Problem Statement

DT failure rate is very high because agricultural consumers are connected to most of the feeders in Upleta area, thus distribution transformers are getting overloaded. DISCOM is interested to implement measures to reduce DT failure rate by studying load pattern through predictive failure analytics using IOT, cloud and AI/ML solution.



## Solution Brief

- Predict and Protect the DT from failure using a distribution transformer monitoring (to understand load/imbalance conditions) and distribution transformer control system (to auto-trip and auto-reconnect the DT once conditions are ok)
  - DTMS (transformer monitoring system) & DTCS (transformer control system) along with the Boltron cloud ensures transformer safety and prevents failure
  - Boltron automatically identifies the affected DT & sends a notification to the respective agent/agency





**Pilot Area:** Upleta Area

**Associated DISCOM:** PGVCL

## Pilot Current Status



- We are undertaking the pilot with PGVCL across 15 locations which also covers one whole feeder of JGY, Gujarat Bhavnagar Region
- AI/ML based automatic DT trip (disconnect) and connect via DTCS once load conditions are stable or operated from Cloud
- Read time WhatsApp alerts for Health of Transformers and overloading or any imbalance conditions
- DTMS/DTCS devices are under fabrication and will be installed in October '22



## Expected Outcome/Benefits from Pilot

- Significant reduction in DT failure (>95%)
- Load pattern analysis per DT
- Auto-connect/reconnect once load conditions are stable
- Full access to telemetry data and predictive analytics AI/ML



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## Problem Statement

DISCOMs are facing DT Failures causing inconvenience for the public, cost overruns and Delays in Replacements. DISCOMs are evaluating prediction models Using Meter Data and other solutions to reduce the DT failures.



## Solution Brief

- ITMS, Intelligent Transformer monitoring Systems, uses 0.5Class Inbuilt energy meter with wireless Temperature module and software suite to predict the failure of the Transformer.
- The proprietary Algorithm focuses on Temperature variations in DT, Winding, Oil & Ambient as baseline for prediction of Failure of the Transformer



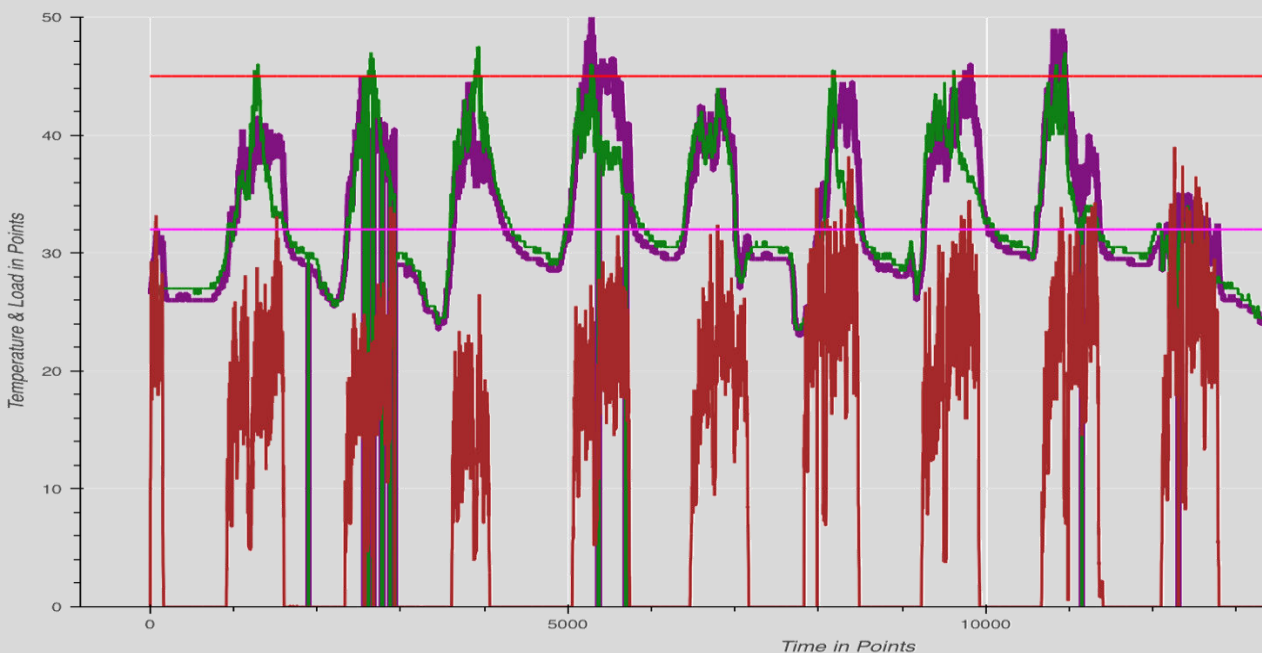
**Pilot Area:** Sector 20 A Panchkula

**Associated DISCOM:** UHBVN



### Pilot Current Status

- 20 Nos Installed on the problematic distribution Transformers in Panchkula Area, Scouting for more Transformers with UHBVN Team to better validate the performance of the ITMS solution and Achieve Prediction of DTR failure.



### Expected Outcome/Benefits from Pilot



- Provides Real Time data on each phase, voltage LOAD, winding Temps, OIL Temps , PF and Real Time min by min Updates , load patterns at Zonal level
- Information on Power theft based on Load.
- Increase profitability of DISCOMs by reducing the Capex and Opex.
- Inventory planning & Management.
- Analytic tools to plan future capacity and area-wise Load utilization.
- Interactive Smart Alerts using Telegram group bots/ WhatsApp Bots etc.
- Increases overall efficiency and saves energy.
- Updates list of manufactures, and customers on servicing and Warranty.





## Problem Statement

Power distribution lines are prone to snapping of conductors and damage to accessories and/or installations causing frequent power outages and flashovers due to vegetation growth and intrusion in and around the power corridors mainly during the summer and monsoon seasons.



## Solution Brief

- Recording the growth of vegetation in area of interest every fortnight of the satellite pass & real-time conditional monitoring using drones.
- Geomatics, predictive analytics and object detection for monitoring vegetation growth, intrusion and fire hazard points' calculations around power distribution networks.



**Pilot Area:** Hanamkonda, Telangana

**Associated DISCOM:** TSNPDCL



## Pilot Current Status

- Normalized Difference Vegetation Index (NDVI) using satellite data completed.
- Dashboard developed.
- Drone survey for real-time conditional monitoring is under progress.



## Expected Outcome/Benefits from Pilot



- Real-time vegetation intrusion and change detection in/around power distributions lines for integrated tree cover management.
- Fire hazard points' assessment around power distribution line corridors.
- The resultant output is 95 % accurate and at 75 % reduced cost over the conventional manual scouting techniques.



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