



GUJARAT POWER RESEARCH & DEVELOPMENT CELL

GUJARAT URJA VIKAS NIGAM LTD

SMART FEEDER MONITORING SYSTEM (SFMS) FOR POWER DISTRIBUTION SYSTEM

ABOUT US

Gujarat Power Research and Development (GPRD) Cell is a research center established by the Government of Gujarat for Gujarat Urja Vikas Nigam Limited (GUVNL) and its subsidiary Companies namely, GSECL, GETCO, DGVCL, MGVCL, UGVCL and PGVCL

GPRD Cell is working under Gujarat Urja Vikas Nigam Limited and funded by the Government of Gujarat through GUVNL. GUVNL is a parent Company of GSECL, GETCO, DGVCL, MGVCL, UGVCL and PGVCL. GSECL is looking after Electricity Generation, GETCO is looking after the Transmission of Electricity and DGVCL, MGVCL, UGVCL and PGVCL are Electricity Distribution Companies looking after the Distribution, Operation and maintenance of Electricity up to the Consumer level in Gujarat.

The success of the leading Companies depends on the strength of their efforts employed towards R&D. Such Companies spare and spent a huge amount of funds for R&D activities. With

this concept and considering the future requirement of the Power, an independent R&D Cell, called GPRD cell has been established.

Electricity is a growth engine of any state/nation. Reliability and quality of power supply are the key parameters of any power utility. The Government also emphasis on reliable and uninterrupted power supply to end-user. The present system of monitoring of power reliability is required to be improved a lot. The present system of reporting seems not reliable due to human intervention. Correct and timely diagnosis of any disease is very essential for remedial actions for its curing. Undiagnosed disease creates havoc in the body if remedial actions are not taken timely. In the power distribution system also, the poor areas can only be diagnosed and rectified if reporting is correct. Real-time remote monitoring without human intervention is the only solution. GPRD cell has undertaken the research pilot project known as "Smart Feeder Monitoring System".

ABOUT SMART FEEDER MONITORING SYSTEM (SFMS) FOR POWER DISTRIBUTION UTILITY

The Smart Feeder Monitoring System (SFMS) is a Self-sustained independent Web-based System for Automated Monitoring System through Data Logging of various essential Parameters and status of all 66 KV Incomer, 11 KV Incomer, Power Transformer, Outgoing 11 KV Feeders from 66 KV substations and make the Information available to GETCO as well as DISCOM Engineers on Real-Time basis for Power Supply Monitoring, Alerts, Meter Data Analysis, Reliability Index Analysis, Information Dissemination and Energy Audit and various holistic MIS reports thereof.

CURRENT SCENARIO

Power Reliability Assessment is the most important parameter to take timely remedial measures to provide an uninterrupted and safe power supply to end-users.

The unscheduled power outages and interruptions badly impact the productivity of industries as well as the agricultural sector.

To measure System Performance, the Electric Utility Industry has developed several performance measures of reliability. These reliability indices include measures of outage duration, outages frequencies, system availability and response time etc. They are known as SAIDI, SAIFI, CAIDI, CAIFI, MAIFI & ASAI.

At present, the periodic calculation and reporting of the above mentioned reliability indices and energy accounting is a manual process in most of the Power Distribution Utility. Therefore, it is less accurate, human dependent, time-consuming, delayed actions of restoration due to unavailability of real-time power outage/availability status of the Feeder.

SOUNDLESS NATURES

Real-Time Monitoring of Feeder breaker status and Electrical Parameters

Trip Duration ↕						
	IND	URBAN	JGY	RURAL	AG	SST
< 15 MIN :	0	0	0	0	0	0
> 15 MIN :	0	0	1	0	0	0
< 1 HRS :	0	0	0	0	1	0
< 4 HRS :	0	0	0	0	0	0

Trip Status ↕						
	IND	URBAN	JGY	RURAL	AG	SST
ON :	2	0	7	0	22	6
SUBSTAINED TRIP :	0	0	1	0	1	0
TRANSIENT TRIP :	0	0	0	0	0	0

SDN	SS	Bus Voltage (KV)	Urban	JGY
Vijapur	66KV Techava	11.3 KV		Feeder: 11KV NEPCHYUN Status: ● Duration: 01:01(HH:MM)

LIMITATIONS OF THE PRESENT SYSTEM

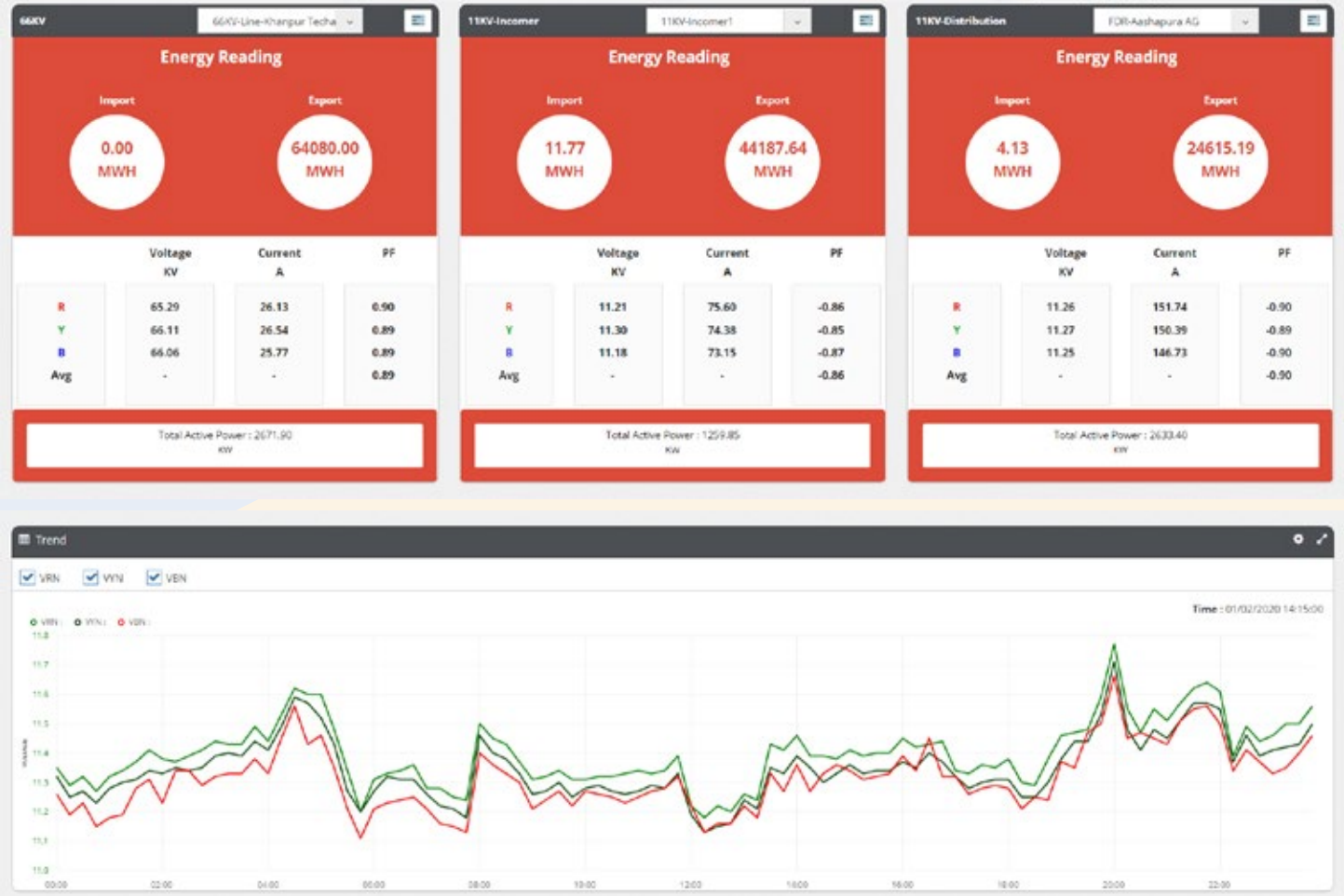
- Real-Time Feeder availability/outage is not available to the system Engineers.
- The manual procedure of 66 KV and 11 KV Bus Loss Calculation and its Energy Audit
- Manual Procedure of reliability indices calculation
- Unavailability of remote access of installed MDAS/ MIS System of the Substation for DISCOMs
- Due to the unavailability of the database of specific fault reasons, no proper preventing maintenance, and planning.

STRATEGIC ABILITY

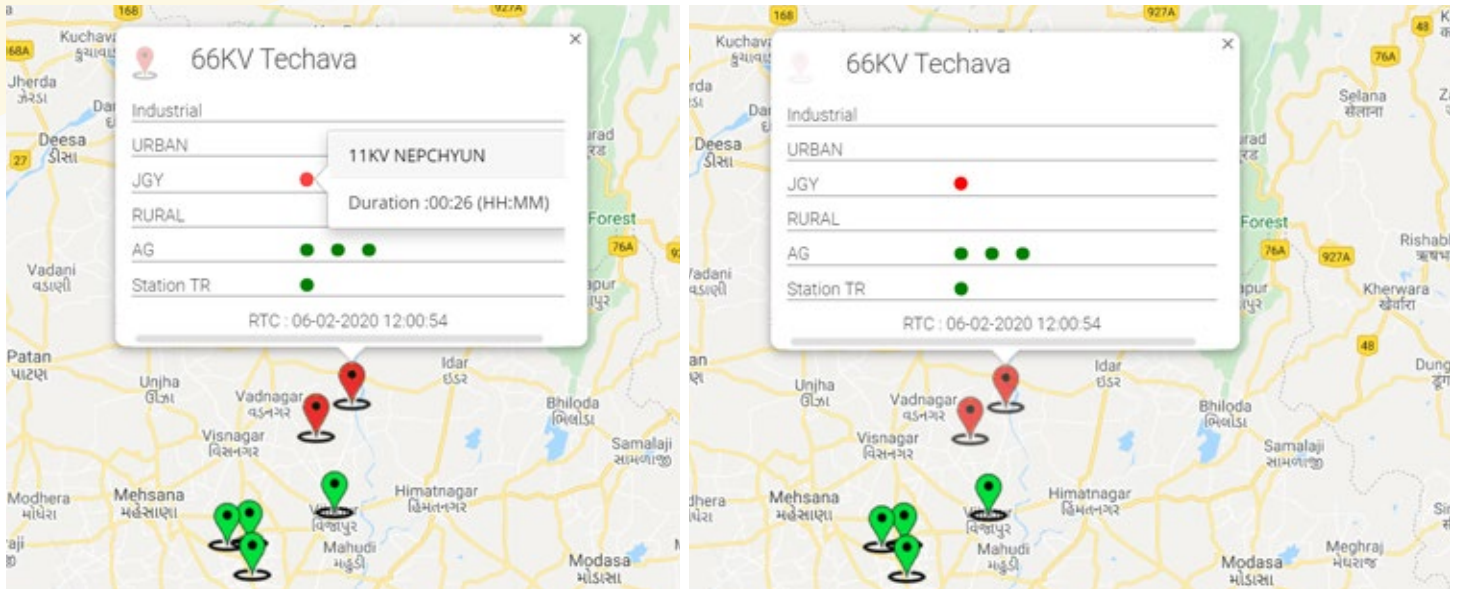
The objective is to develop a remote Monitoring and Controlling System for Power Distribution Feeders of utilities. With in-depth research, we have developed a Smart Feeder Monitoring System (SFMS) at 66 KV Sub-Stations incorporating real-time monitoring of all substation equipment like all 66 KV Incomers, OTI and WTI of Power Transformers, OLTC, Capacitor bank, 11 KV Incomers and Feeders, battery status, etc.

The architecture of the SFMS is to monitor the Real-Time status of the Feeder breaker with IoT based Breaker Monitoring Unit (BMU) and Data acquisition of Electrical Parameters from the Panel Energy Meters with IoT based Master Controlling Unit (MCU). The System captures the physical ON/OFF status of the breaker; precisely, it also captures that Breaker has operated under fault condition or under manual operation. it is also possible to have Real-Time loading and Power outages of Feeders. With the help of important status and Electrical Parameters, various MIS reports can be generated automatically without human intervention viz. Energy Audit, Meter Data Analysis, Feeder wise Real and Re-active loading,, For complete substation and reliability indices. The system is capable to generate required notifications to system Engineers.

Real-time incoming/outgoing feeders electrical parameter monitoring and analysis using trend curve



Real-Time Geo-Monitoring of Feeder status



System Calculated Bus loss and reliability indices

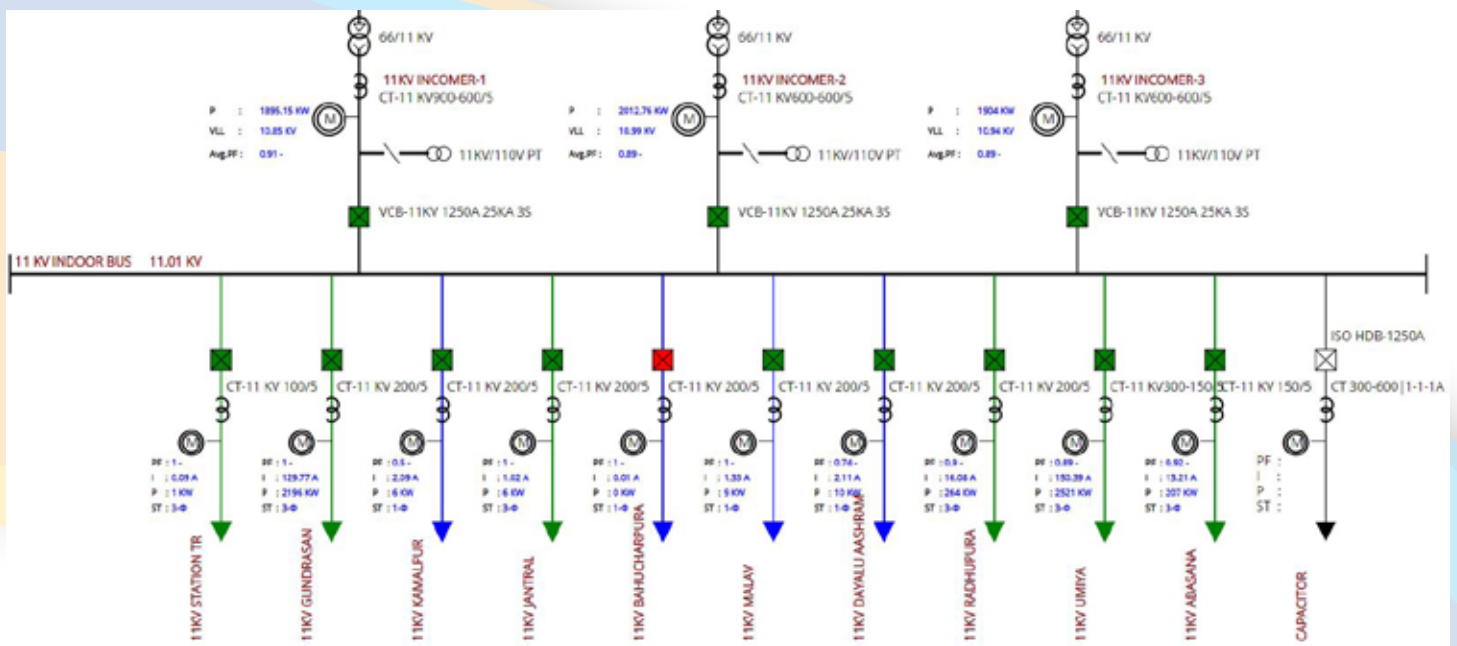




• Reports

- ▶ Outage reason wise Analysis
- ▶ Feeder Uptime/Downtime Analysis
- ▶ Feeder Overload Analysis
- ▶ Low PF / KVAR Analysis
- ▶ Bus Voltage Analysis
- ▶ Periodic Transformer loss/bus loss
- ▶ Periodic Reliability indices
- ▶ Customized Notification and alert to end users

Real time substation monitoring - SLD view



FIELD STUDY REPORT

In the initial phase, the SFMS has been deployed at six numbers of 66 KV substations under the Vijapur Division of UGVCL. A total of 83 Units of BMU and 6 Units of MCUs have been installed and commissioned in these six substations. The performance of SFMS is being monitored by a responsive Web-based application.

CONCLUSION

The Smart Feeder Monitoring System (SFMS) is a key tool for Power Distribution Utility to make the power system sound, reliable, safe and efficient without investing much.

FOR MORE DETAILS, PLEASE CONTACT US WITHOUT HESITATION,

WE ARE READY TO HEAR AND SERVE YOU AT

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