



•Canada



•Australia

KAIFA G3-Hybrid Communication Experience Sharing

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01

Part One

Company Introduction

Leading end-to-end **AMI Solution Provider** and utility business **digitalization enabler**, established as result of the surge of European smart metering business growth is a member of Kaifa Group.

Since **1995Y**

80+ Utilities' selection

Top 1
Among Chinese meter vendors overseas

92 M
meters deployed

19
Service centers globally

10+ M
Production Capacity annually

Headquarters located in **Chengdu**. R&D, Sales, Test and Production are **all in one campus**.

Local service centers world wide, including subsidiary KFBR, KFUK, KFNL, KFTL and KFHK and partnered plants in Romania, Saudi Arabia, Thailand and Brazil.

Headquarters
China Chengdu, China

Regional Sales & Service Center

- Hong Kong, China
- Shenzhen, China
- London, U.K.
- Amsterdam, Netherlands
- Bangkok, Thailand
- Tashkent, Uzbekistan
- Sao Paulo, Brazil
- Riyadh, Saudi Arabia
- Ploiesti, Romania

- Seoul, South Korea
- Dakar, Senegal
- Abidjan, Ivory Coast
- Islamabad, Pakistan
- Dhaka, Bangladesh
- Manila, Philippines
- Kuala Lumpur, Malaysia
- Dusseldorf, Germany
- Vienna, Austria
- Lisbon, Portugal

Plants

- Chengdu, China
- Bangkok, Thailand
- Sao Paulo, Brazil
- Ploiesti, Romania
- Riyadh, Saudi Arabia
- Kuala Lumpur, Malaysia
- Jakarta, Indonesia

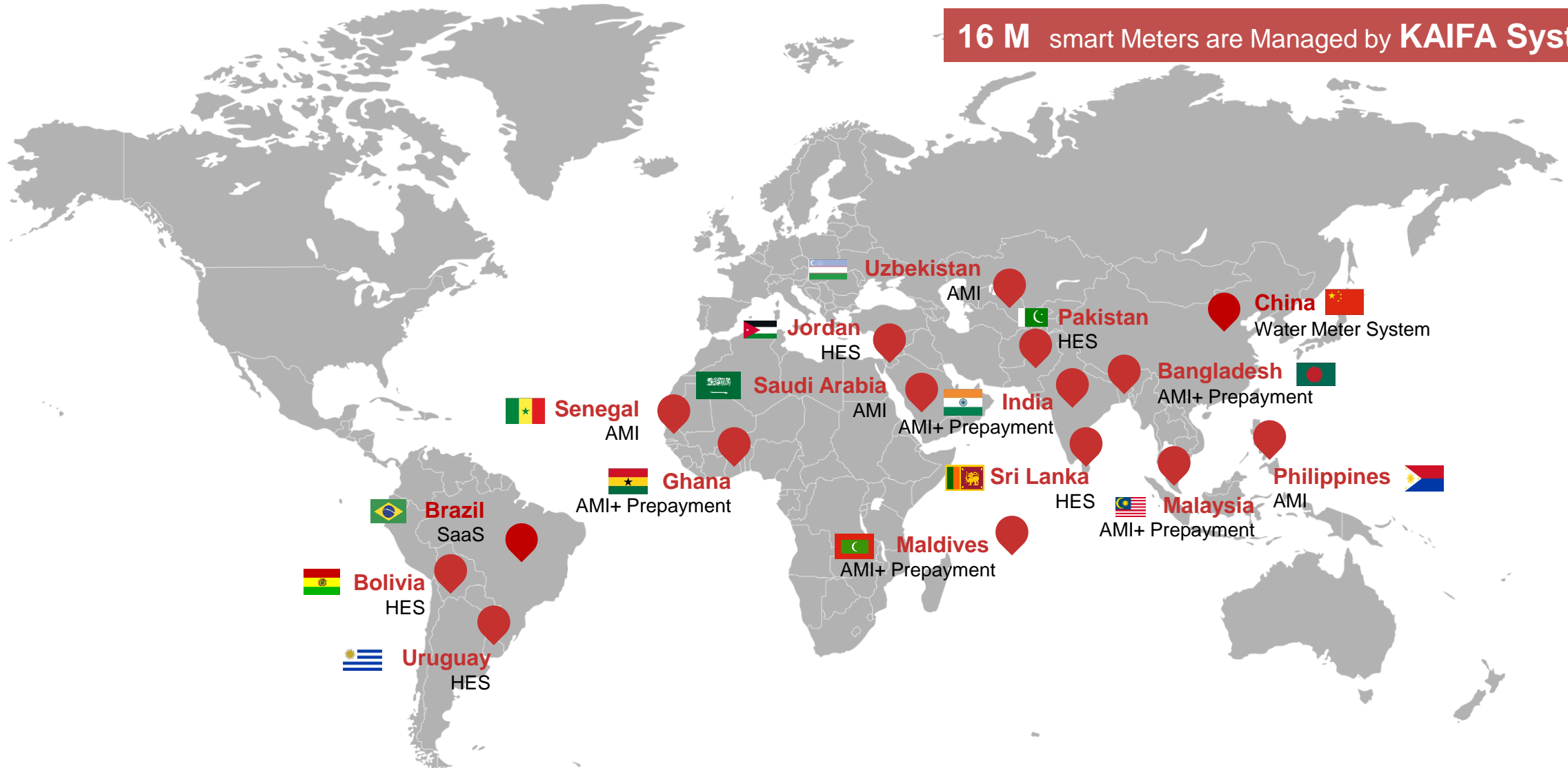


Shipment Performance



Empower System & Service

16 M smart Meters are Managed by KAIFA System



G3-PLC Experience



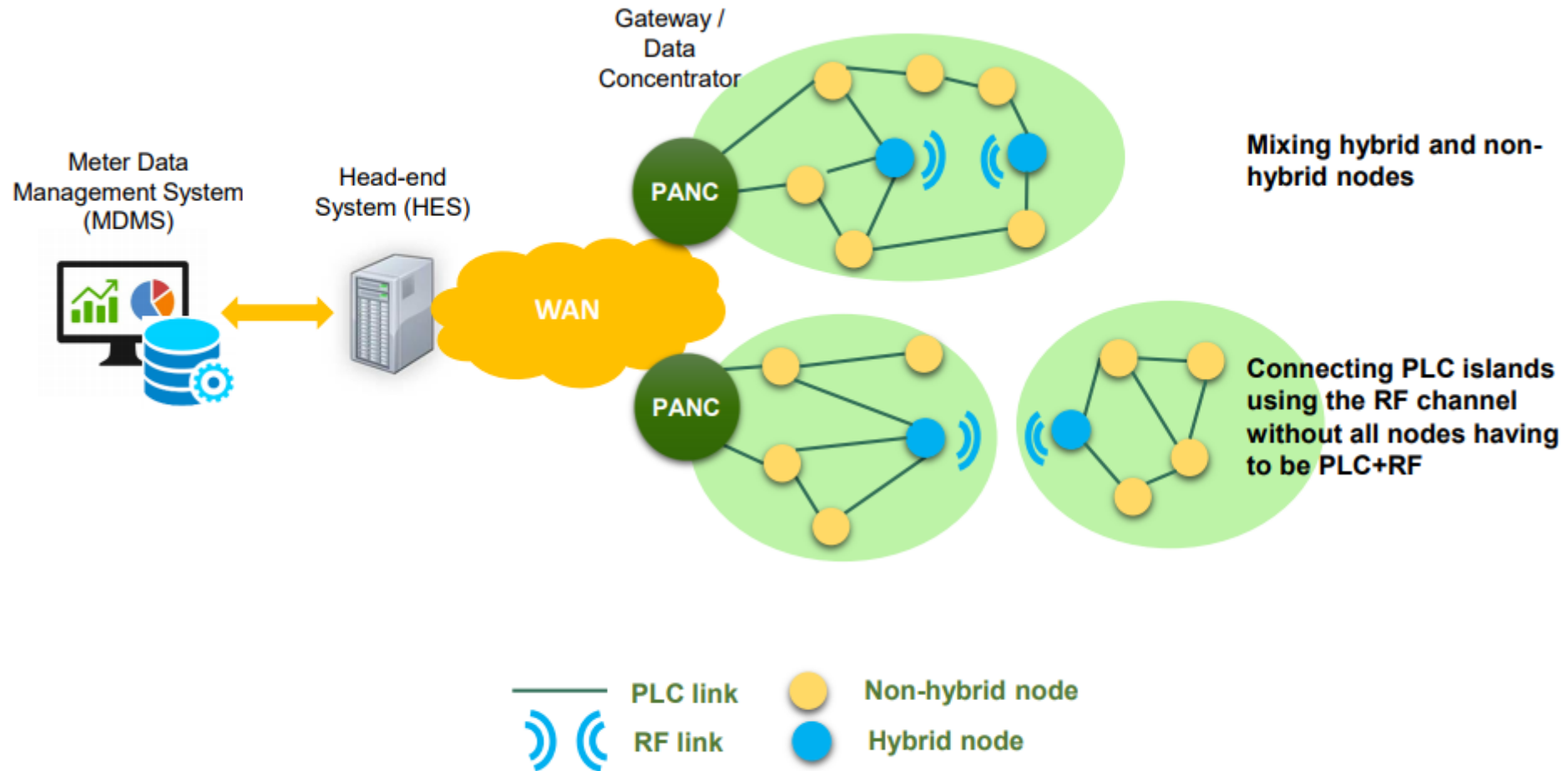
KAIFA G3-PLC Major Project Information Summary

Project	Communication Solution	PLC solution	KAIFA G3-DCU	KAIFA G3-PLC Meter
Austria	PLC + Cat1	G3-PLC		1.5M
Poland	PLC + LTE	G3-PLC		168K
Uzbekistan REPN	PLC+RF+GPRS	G3-PLC	25K	1.3M
Pakistan IESCO	PLC+LTE/GPRS	G3 PLC G3 Hybrid pilot	13.4K (include Subcontractor)	1.06M (include Subcontractor)
Tajikistan Shabakahoi Taqsimoti Barq	PLC+2/4G+RS485	G3-PLC	5K	100K
Uruguay	PLC+LTE/Cat-M	G3-PLC	1.1K	195K
Cote d'Ivoire –CIE	G3 PLC only	G3-PLC	4K	700K
Total			53.6K	5M

02

Part Two

Hybrid G3-PLCsolution



Hybrid Module specification

Features

- Support G3 PLC CENELEC A, FCC band
- Hybrid G3-PLC with RF expansion
- Automatically register into PLC network
- Support broadcast Firmware upgrade
- Based on IEEE 802.15.4-2020 standard
- Modular design, Fully backwards compatible design

Operation voltage: DC 12V to 18V

Communication frequencies

- Modulation: (ROBO1/4)/DBPSK/DQPSK/D8PSK for G3_PLC
- Modulation: 2-FSK for RF
- Frequencies for G3 PLC CENELEC A : 35.9375 kHz to 90.625 kHz
- Frequencies for G3 PLC FCC : 154.687 kHz to 487.5 kHz
- Frequencies for 920MHz-925 MHz

Data rate

- G3 PLC CENELEC A: DBPSK: 20.5 kbps, DQPSK: 35.4 kbps , D8PSK:43.5 kbps
- G3 PLC FCC: DBPSK: 77.2 kbps, DQPSK: 166.4 kbps , D8PSK:152.899 kbps
- G3 PLC RF: 50kbps (ERP≤23dBm)

Power consumption

- Standby: < 45mA@15V
- Communication: <200mA@15V(average)
- Transmit peak :700mA@15V

Ambient condition

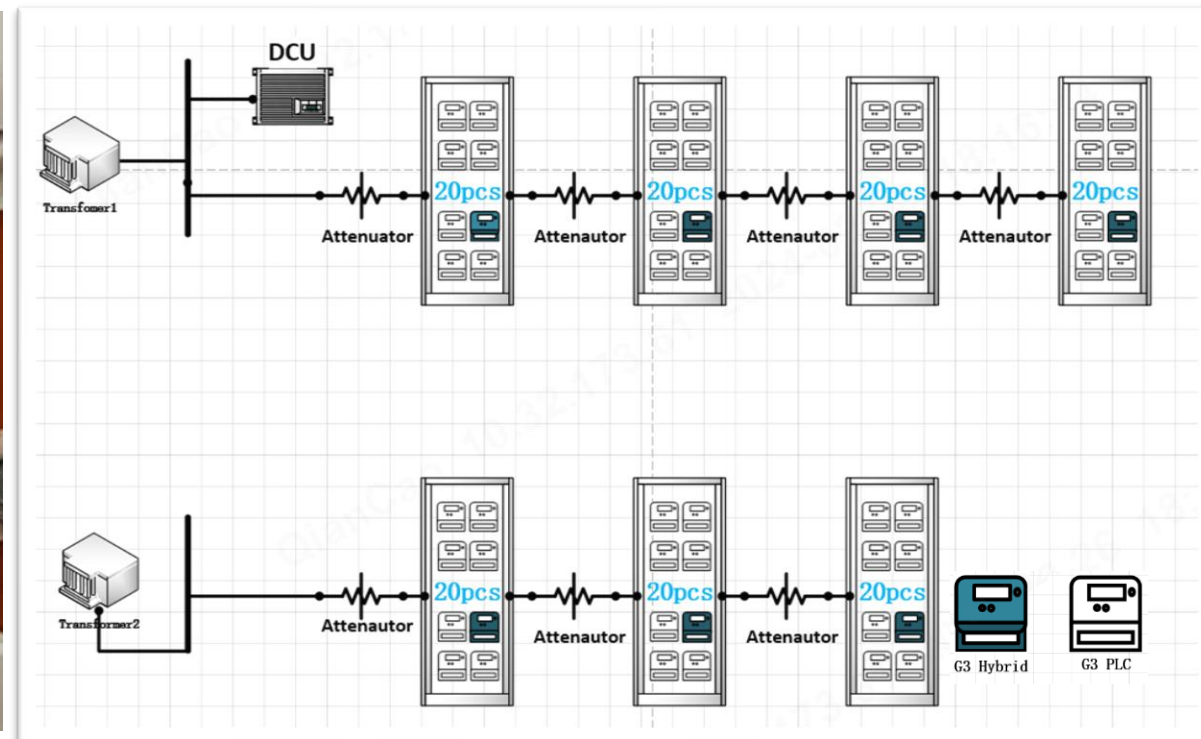
- Operation Temp.: -40°Cto 80°C
- Storage Temp.: -40°Cto 80°C
- Max relative humidity: up to 95%, non-condensing



Performance Test

KAIFA has the PLC performance test LAB, the LAB will be used to perform the Hybrid performance test

- Independent transformer power supply, simulating island state
- Build up the critical PLC environment by PLC Blocking filter and Noise generator
- Dynamically adjust PLC link quality, monitor the topology at different time of the day



On-site Test

➤ Evaluate the adaptability and business performance of G3 PLC/G3 Hybrid communication solutions under real network conditions, including data acquisition success rate, upgrade efficiency, etc.

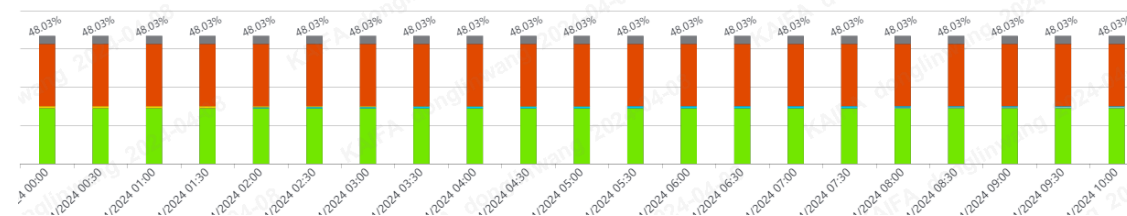
◆ Pilot Test Filed in KAIFA Factory

◆ Dormitory: 1pcs DCU, 96pcs PLC Meters

◆ Office: 104pcs PLC Meters



◆ Before replace G3 hybrid module, all of meters at office not collected, total collected rate is 48%



◆ After replace 3pcs hybrid module at both of dormitory and office, all of meters at office are connected.



03

Part Three

IESCO Project Introduction

IESCO Project Overview

IESCO, Islamabad Electric Supply Company, is a prominent electric utility company in Pakistan, The company's service area includes Islamabad, parts of Rawalpindi, and surrounding districts, covering a diverse customer base ranging from residential to commercial and industrial, totally 37 millions consumers

KT-KAIFA Consortium Scope of works of IESCO AMI project mainly consists of three parts, ① Supply of Smart Meters ② Development of AMI System ③ Supply of Equipment, Training, Technical support & Maintenance for IESCO

Supply of Smart meters(860K ea), BCD meter, DCU, IHD and Field equipment



PLC/LTE Meter

CT/VT

DCU

IHD

PLC	LTE	CT/VT	DCU	IHD
774 K	86K	20K	13.4K	860K



Field Engineer

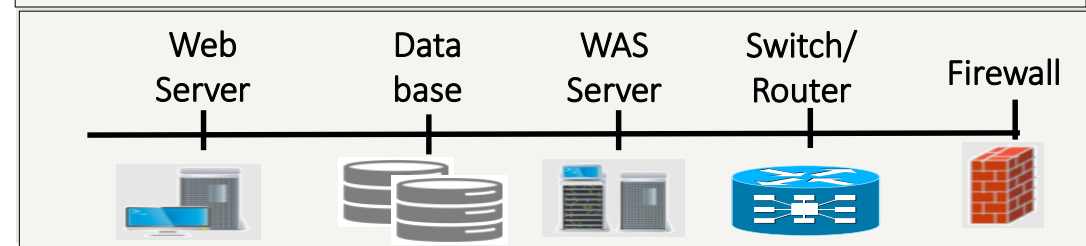
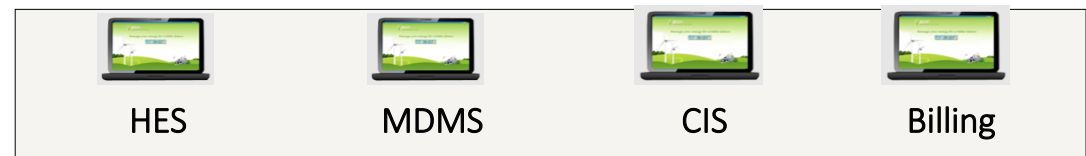
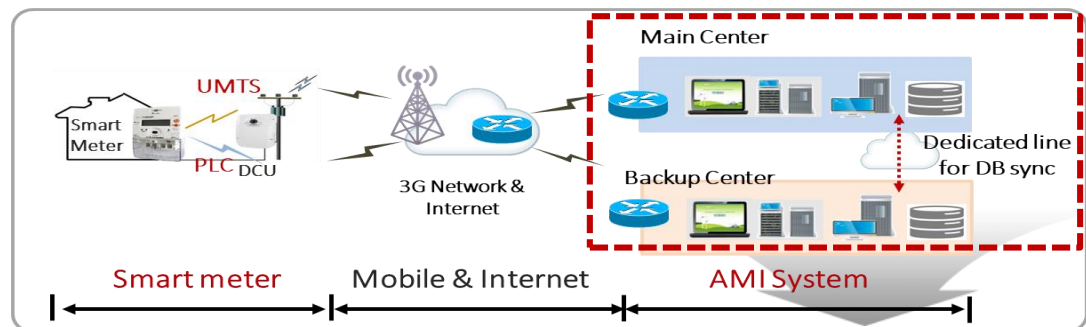


Deployment System (Hand-held Unit)



HES & MDMS System

Development of HES, MDMS, CIS and Billing system in Main & Backup Center



IESCO Project Overview



Original Contract

- PLC 774K
- LTE 106K
- DCU 13.4K

1st Enhancement

- PLC 292K
- LTE 47K

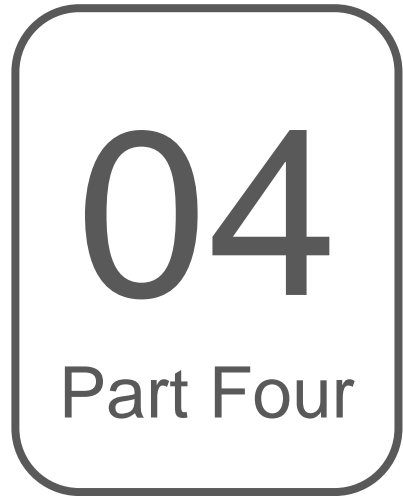
2nd Enhancement

- **Total 300K**
- PLC ?
- **Hybrid PLC ?**
- LTE?



Installation Progress Till end of March

- PLC Meter: 640K
- LTE Meter: 60K
- DCU: 9.3K



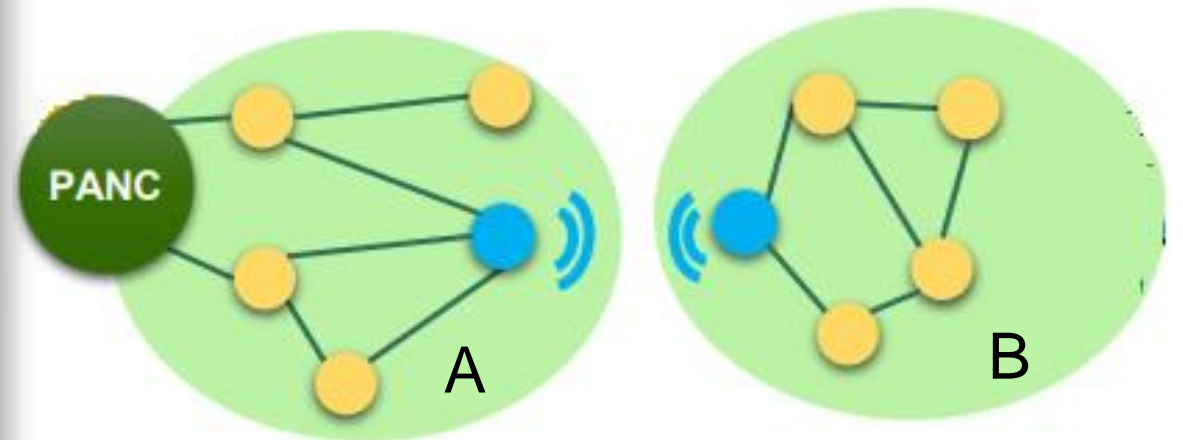
Field Test

Harsh PLC Condition between Two Cluster

Cluster A and B may cannot establish PLC communication link because of vary reasons:

- High PLC Noise
- PLC signal attenuation caused by electricity elements
- Long power line distance but short geographical distance

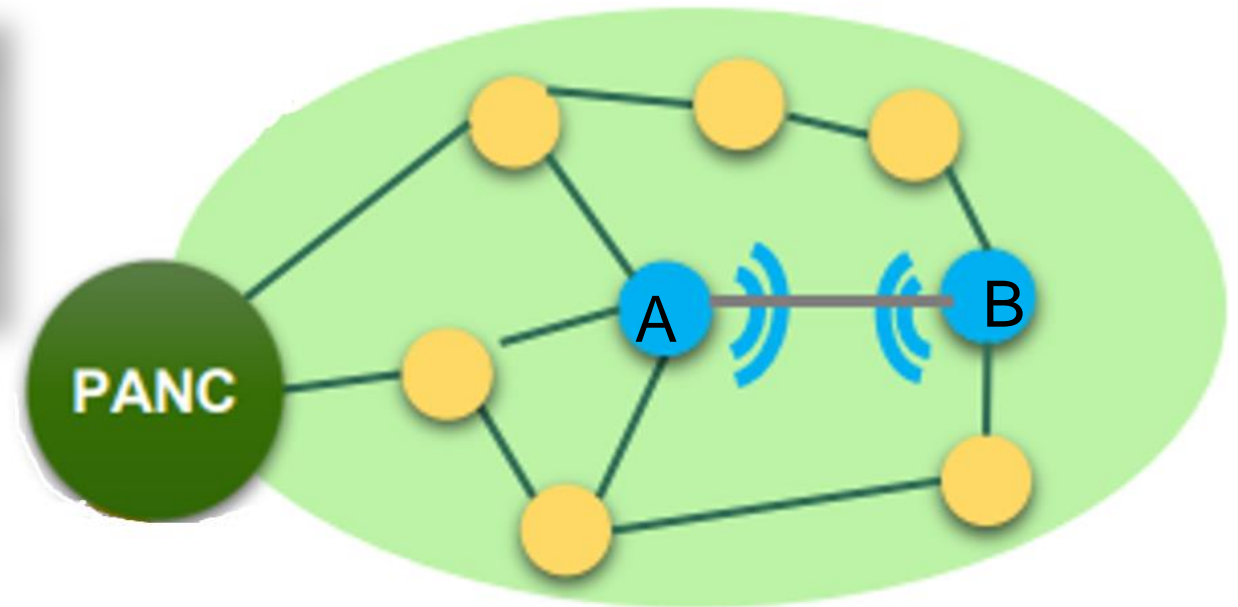
Replace one PLC node in each of the two clusters with hybrid node can establish reliable RF link



Time Varying PLC Condition

PLC communication condition between node A and B is time vary.

Hybrid solution's dynamic media selection guarantee all time connectivity.



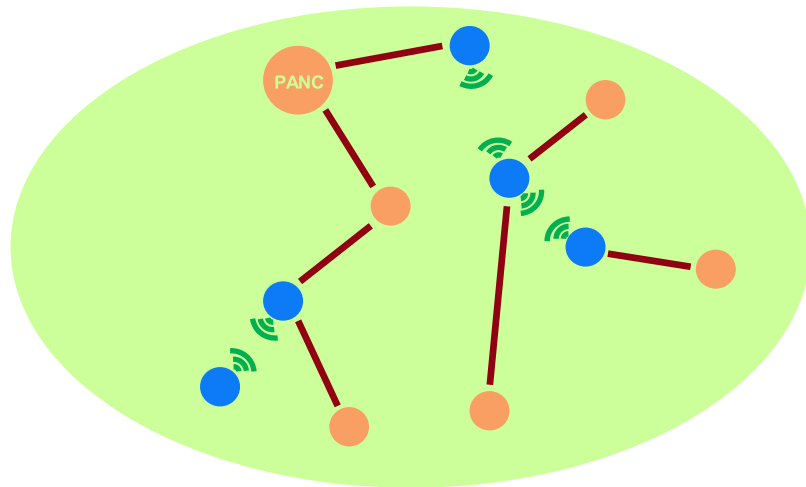
TR9354- Background

- **TR9354**, totally covers 123 meters
- Daily data collection rate was around 87% due to poor PLC communication
- After on-site investigation, showed communication status of meters as on the map
 - Green dots represent meters with normal communication
 - Red dots represent meters which no communication.



TR9354- Test Conduct

Based on the on-site analysis and monitoring, finally 16 meters PLC module have been replaced to hybrid modules, DCU keep using PLC module.



- G3-PLC PAN Coordinator
- G3-PLC Hybrid PAN Device
- G3-PLC None-Hybrid PAN Device
- RF Link
- PLC Link



TR 9354 - Test Result



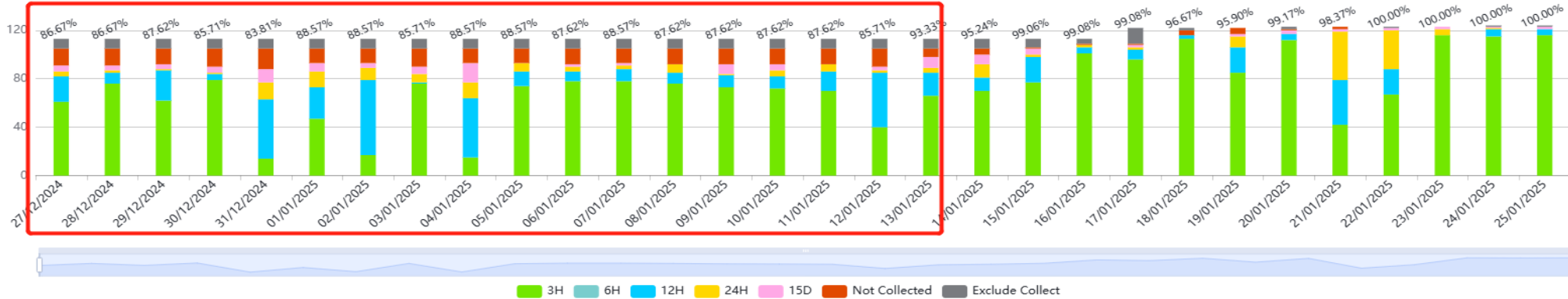
After hybrid is adopted, the success rate of data collection has been significantly improved ,the daily data collection rate has promoted from 87% to almost 100%.

Daily Profile Monthly Profile Energy Load Profile Quality Load Profile Communication Type 25/01/2025 Recalculate

Transformer 200 KVA(9354): Last 30 days data collection status

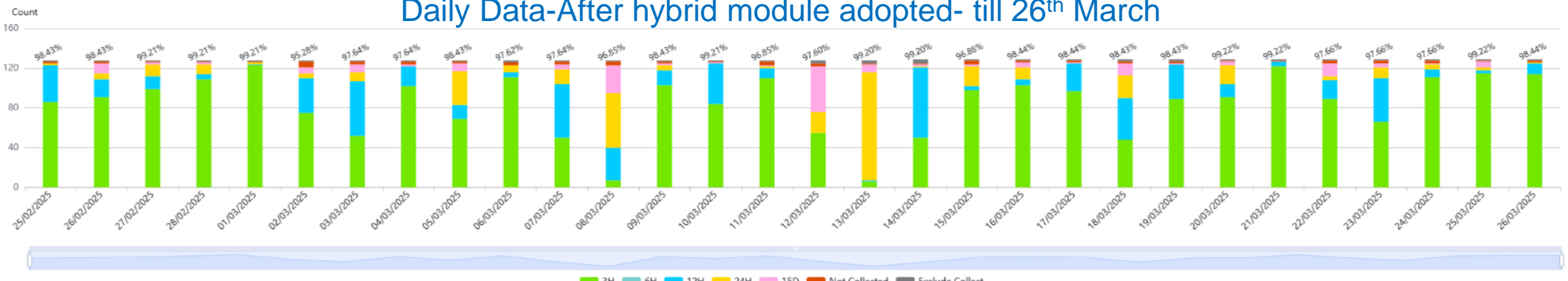
Daily Data-Before hybrid module adopted

Daily Data-After hybrid module adopted



Daily Profile Monthly Profile Energy Load Profile Quality Load Profile Communication Type 26/03/2025 Recalculate

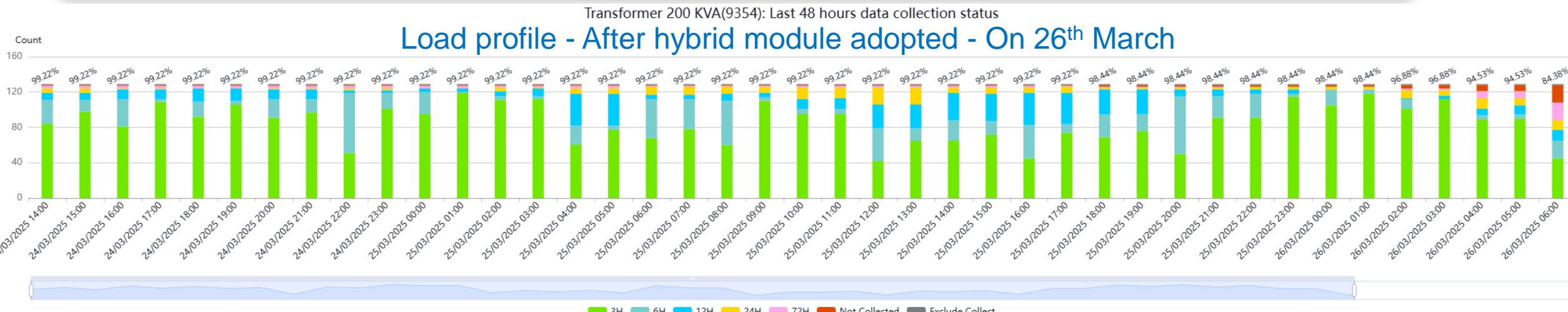
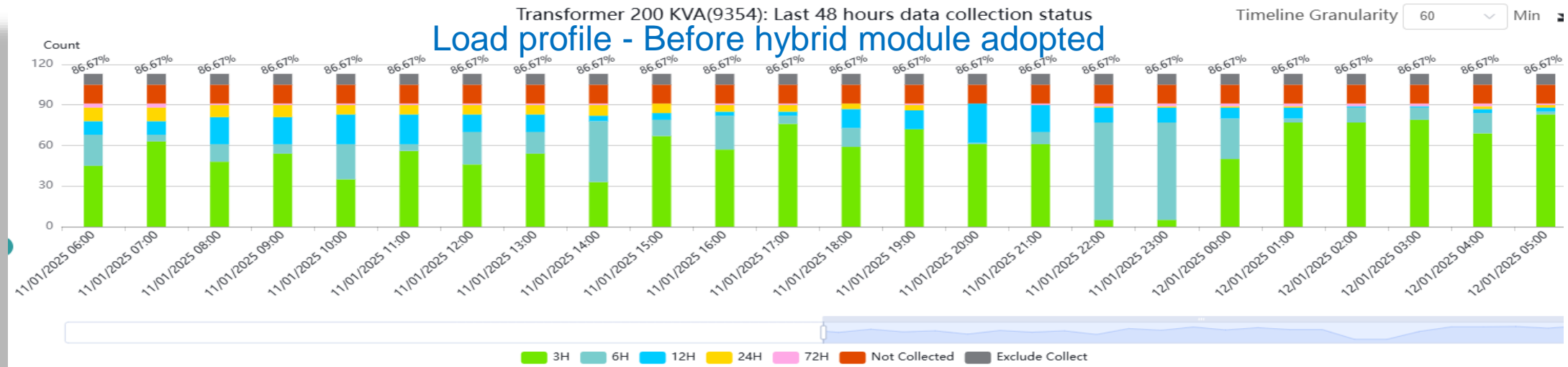
Daily Data-After hybrid module adopted- till 26th March



TR 9354 - Test Result

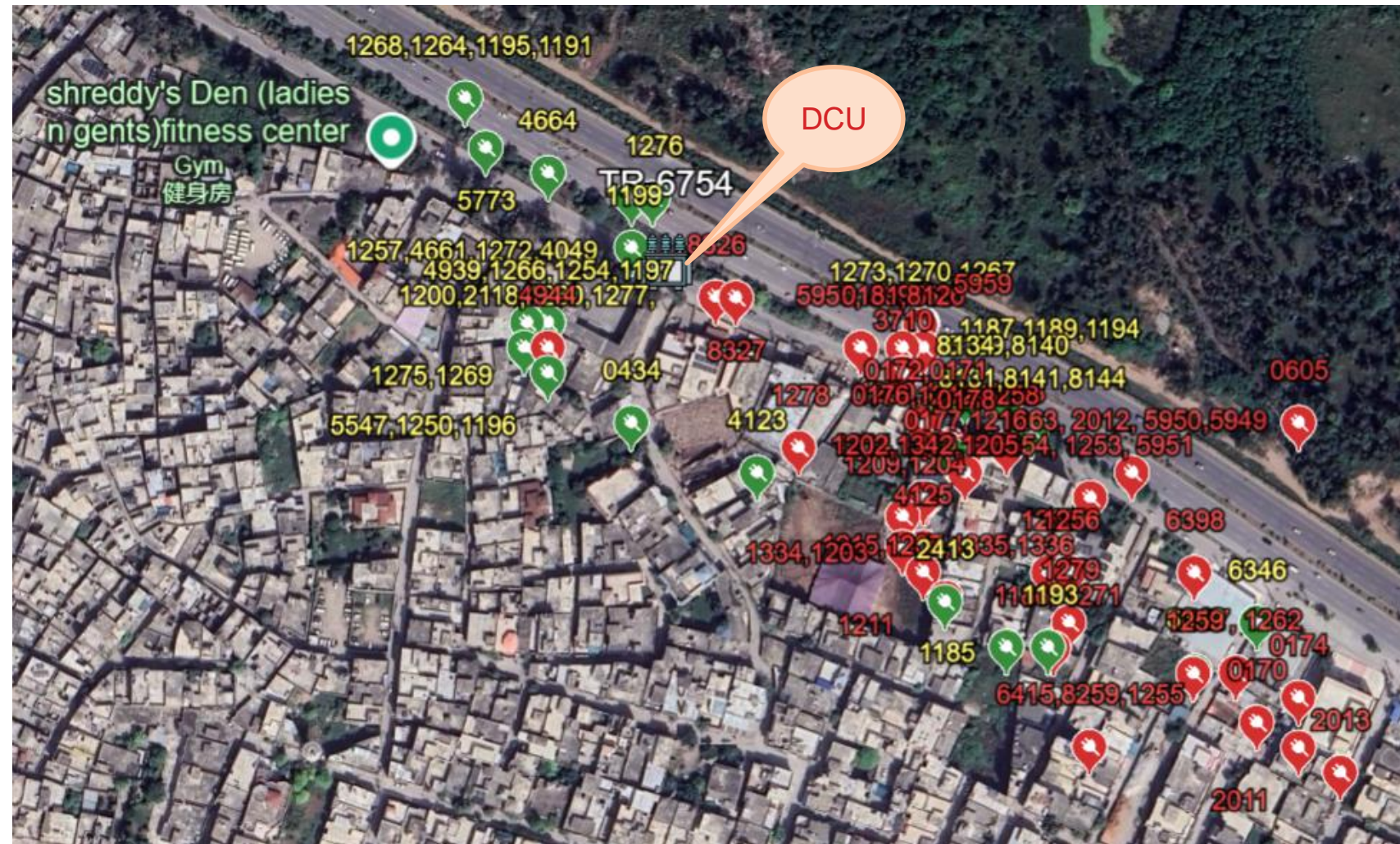


After hybrid is adopted, the success rate of data collection has been significantly improved ,the 1 hour load profile collection rate has promoted from 87% to almost 100%.



TR 6754 - Background

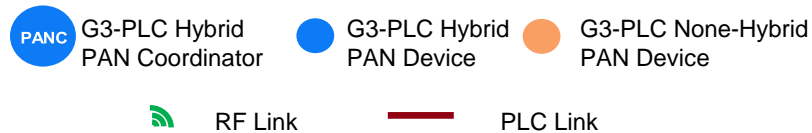
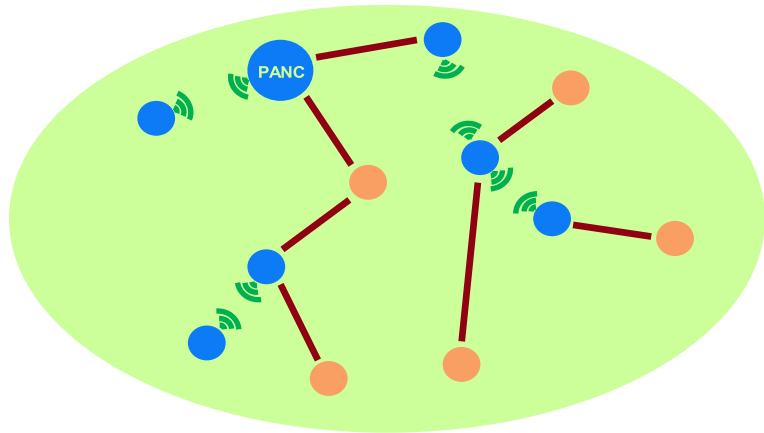
- **TR6754**, totally covers 116 meters
- Daily data collection rate was around 37% due to poor PLC communication
- After on-site investigation, showed communication status of meters as on the map
 - Green dots represent meters with normal communication
 - Red dots represent meters which no communication.



TR 6754 - Test Conduct

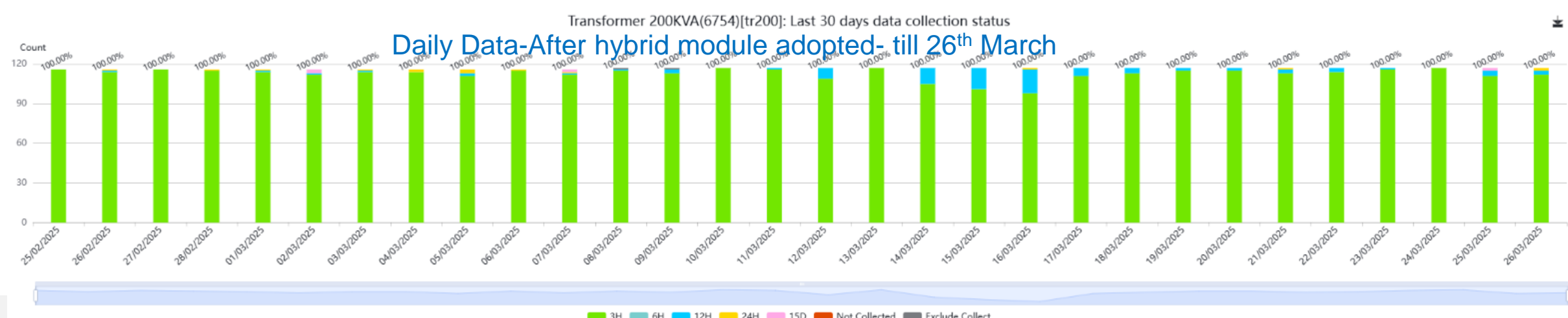
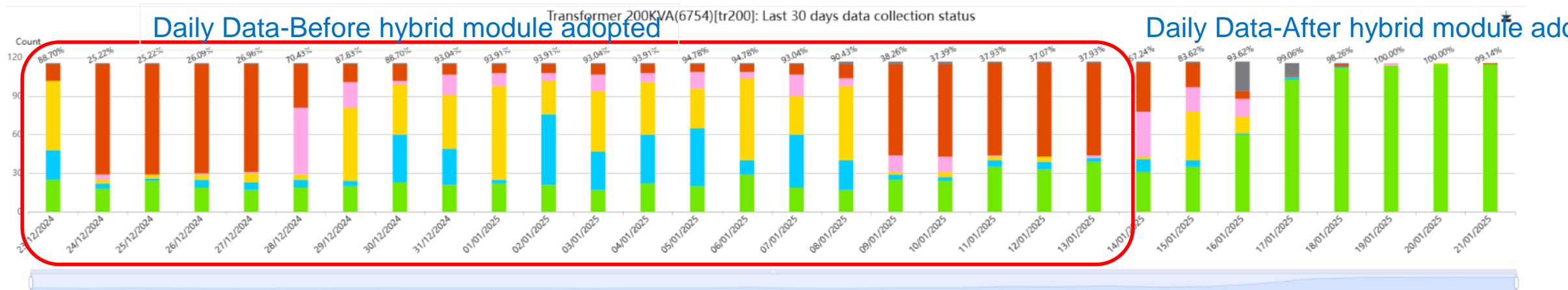
Based on the on-site analysis and monitoring, finally 16 meters PLC module have been replaced to hybrid modules.

And DCU PLC module also has been changed to hybrid module.



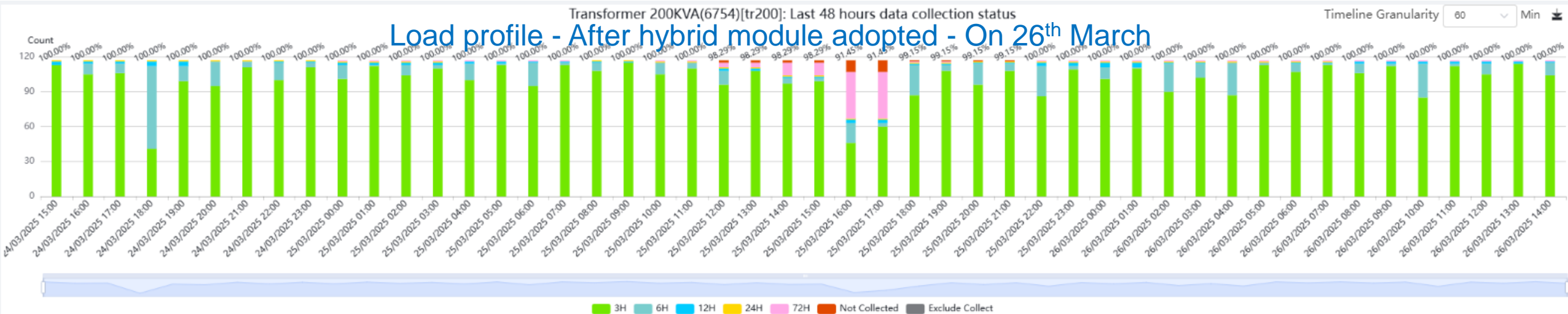
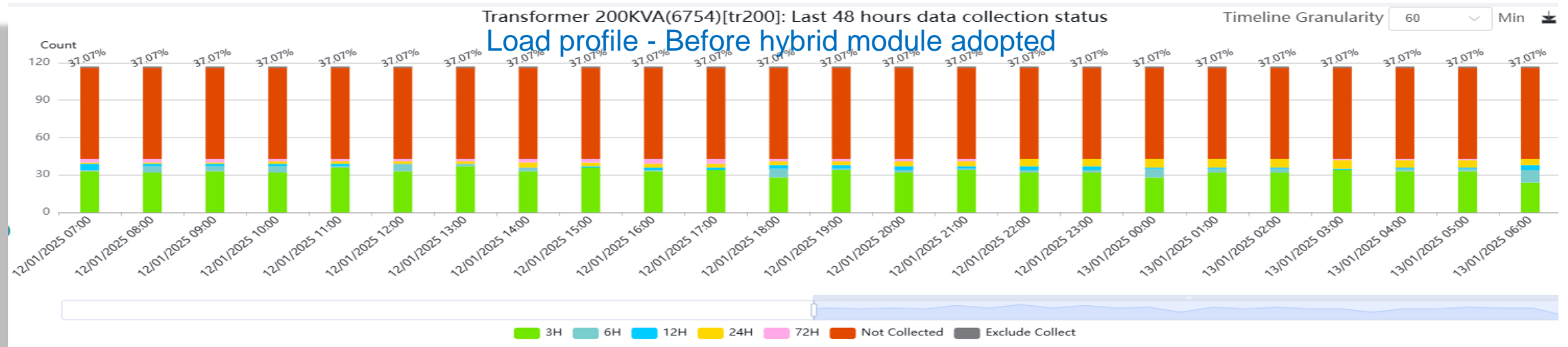
TR 6754 – Test Result

After hybrid is adopted, the success rate of data collection has been significantly improved ,the daily data collection rate has promoted from 37% to 100%.



TR 6754 – Test Result

After hybrid is adopted, the success rate of data collection has been significantly improved ,the 1 Hour load profile data collection rate has promoted from 37% to 100%.



TR 9146 – Test Result



◆ TR9146 , test performed by IESCO team, totally covers 30 meters, before deployment hybrid module the daily data collection rate is 60%, 5 hybrid module have been deployed at site, the daily collected rate promoted to 100%.

Daily Profile Monthly Profile Energy Load Profile Quality Load Profile

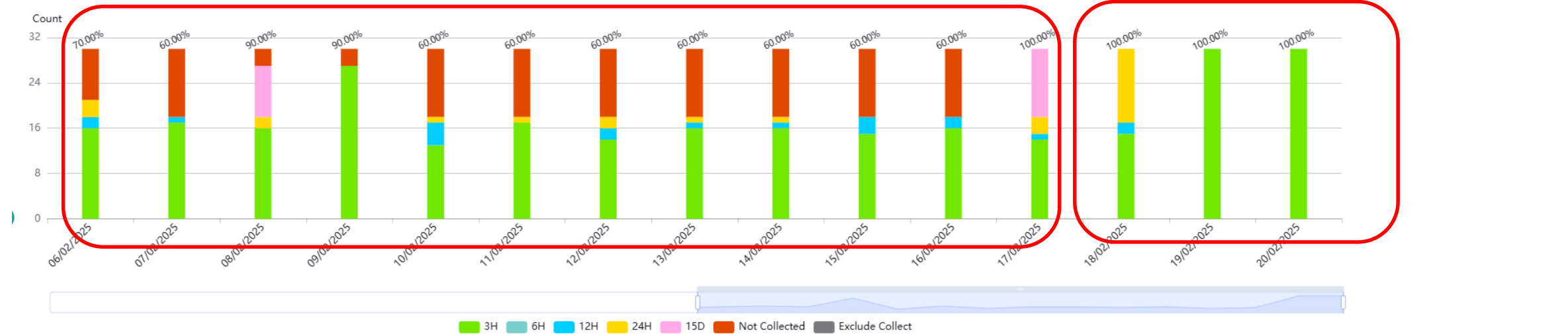
Communication Type

20/02/2025

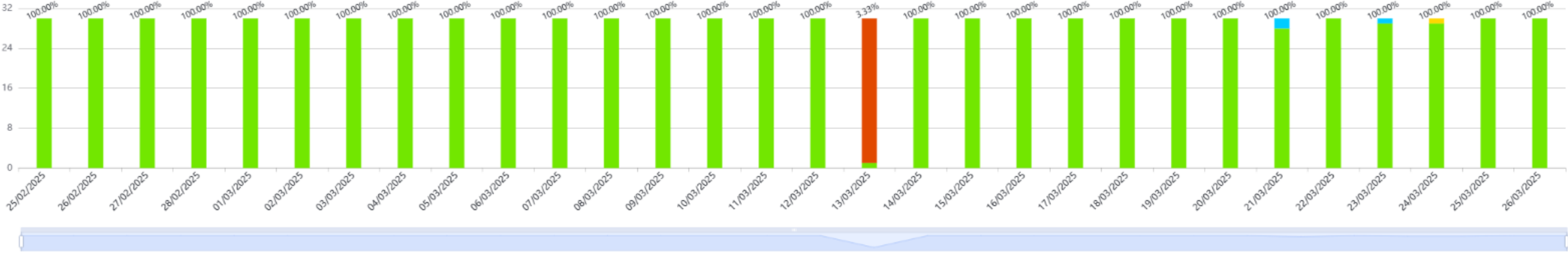
Recalculate

Daily Data-Before hybrid module adopted Transformer 200 KVA(9146): Last 30 days data collection status

Daily Data-After hybrid module adopted

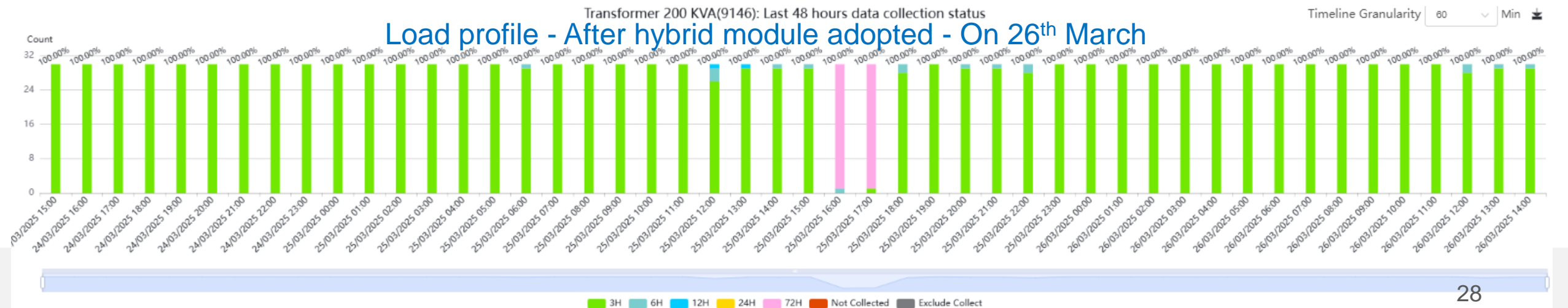
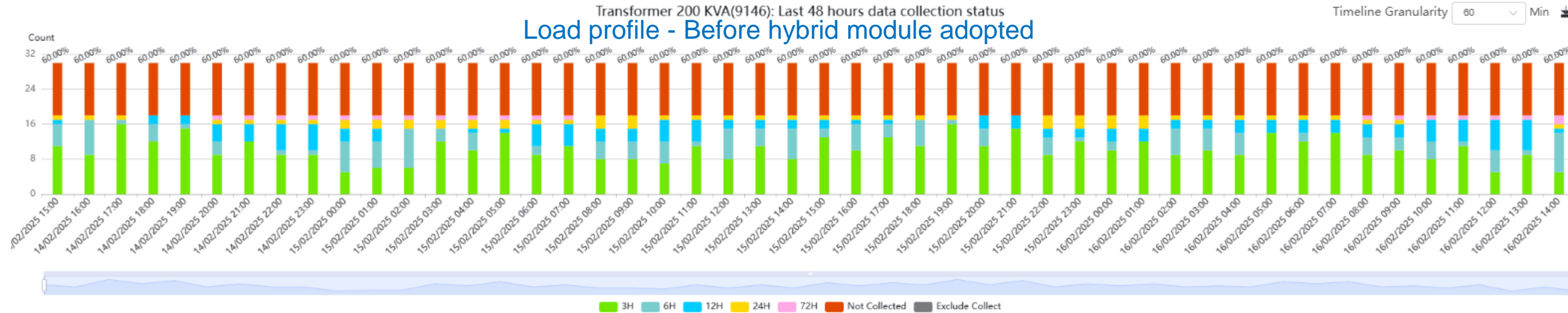


Transformer 200 KVA(9146): Last 30 days data collection status
Daily Data-After hybrid module adopted-Till 26th March



TR 9146 – Test Result

After hybrid is adopted, the success rate of data collection has been significantly improved ,the 1 Hour load profile data collection rate has promoted from 60% to 100%.



Summary of Test Result

No.	Site Area	Tester	TR. No.	Number of Meter	Test period	Qty. PLC replaced by HB.	Test Results	
							Data collection status <u>before</u> Hybrid PLC adopted	Data collection status <u>after</u> Hybrid PLC adopted
1	IESCO Rawalpindi site	KAIFA and IESCO(PIU&PIC)	TR9354	123 (129)	2025.01.14 to date	16 (Meter module)	Daily Profile 83%~88% Load Profile 87%	Daily Profile 98.5%~100% Load Profile 98%
2			TR6754	117	2025.01.14 to date	16 (Meter module) 1 (DCU module)	Daily Profile 25%~37% Load Profile 37%	Daily Profile 100% Load Profile 100%
3		IESCO(PIU&PIC)	TR9146	30	2025.02.17 to date	5 (Meter module)	Daily Profile 60% Load Profile 60%	Daily Profile 100% Load Profile 100%

Thank You