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Host Utilities



TATA

TATA POWER
TPCSDL

TP CENTRAL ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)



TATA POWER-DDL

TPNODL

TP NORTHERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)

Co-Host Utilities

TPWODL

TP WESTERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)

TPSODL

TP SOUTHERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)

BSES

BSES Rajdhani Power Limited

BSES

BSES Yamuna Power Limited

Utility Partner



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DISTRIBUTION
UTILITY MEET
DUM2022

SESSION – 5: CLIMATE CHANGE READINESS DISASTERS READINESS AT PLN

Speaker
PLN, Indonesia



The Distribution Utility Meet (DUM 2022)
ISGF's Annual Conference and Exhibition for Electricity Distribution Companies



Climate Change Readiness Disasters Readiness at PLN

Bhubaneshwar, Odisha, India

18th November 2022



Sistem Manajemen
Anti Penyuapan (SMAP)

PLTS Pulau Messa, Nusa Tenggara Timur

www.pln.co.id

Personal Data



PLN



Ir. Eman Prijono Wasito Adi

Education

1992 Bachelor of Mechanical Engineering – Universitas Indonesia

Work Experience

2020-Now President Commissioner, PT. Pelayanan Listrik Nasional Tarakan, Indonesia.

2022-Now Executive Vice President of Strategic Distribution Planning,
Distribution Directorate, PT. PLN (Persero), Indonesia.



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Outline



1. Overview
2. Mitigation and preparedness
3. Response and recovery

Overview



Indonesian Archipelago



PLN



| | | | |
|------------|---|--------------|-----------------|
| Total area | : | 1.916.906,77 | Km ² |
| Water area | : | 23,62 | % |
| Land area | : | 76.38 | % |
| Islands | : | 16.766 | island |
| Costline | : | 54.720 | Km |
| Province | : | 34 | provinces |
| Villages | : | 84.096 | villages |
| Population | : | 272.74 | million |

PLN Overview



PLN



Sumatera & Kalimantan distribution operation zone

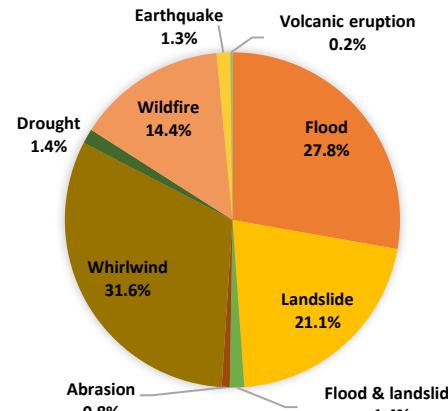
Jawa, madura & Bali distribution operation zone

Sulawesi, Maluku Papuan & Nusa Tenggara distribution operation zone

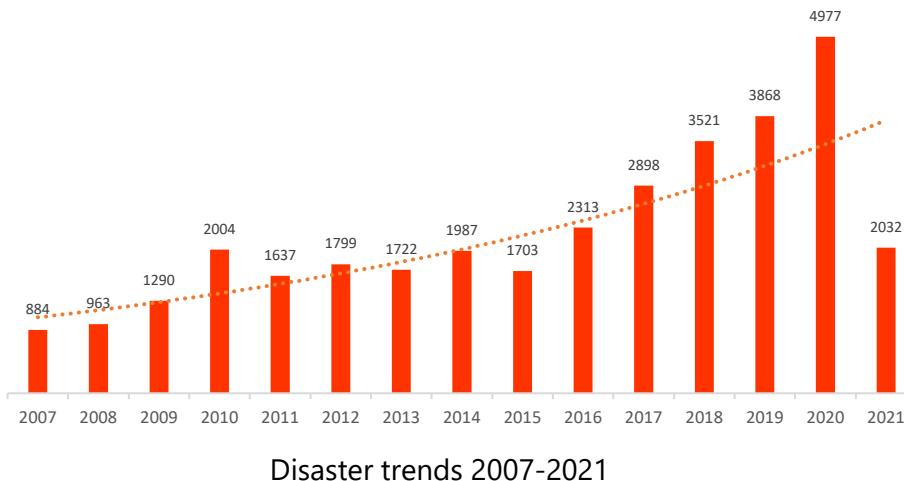
2021

| | | | |
|----------------------------|---|------------|-----------|
| - Peak Load | : | 42.801,77 | MW |
| - Transmission line | : | 64.806,79 | Kms |
| - Power transformer | : | 2.269 | unit |
| | : | 155.968,25 | MVA |
| - MV distribution line | : | 423.807,51 | Kms |
| - LV Distribution line | : | 598.316,55 | Kms |
| - Distribution transformer | : | 542.958 | unit |
| | : | 64.340,88 | MVA |
| - Customers | : | 82.543.980 | customers |
| | : | 153.565,96 | MVA |
| - Energy Sales | : | 257.634,25 | GWh |

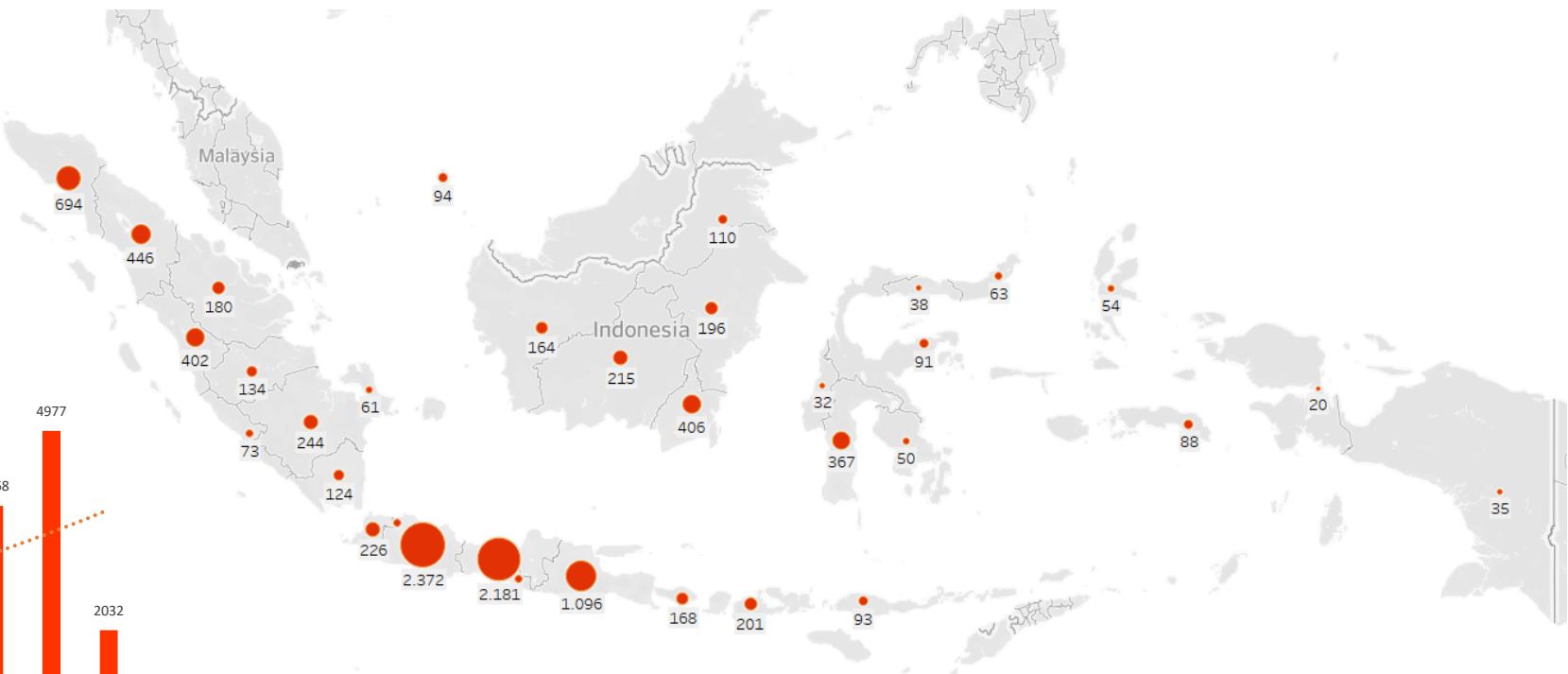
National Disaster statistics



Composition of disasters 2019-2021



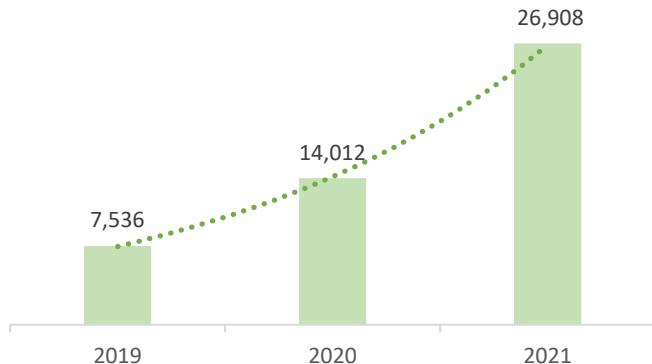
Disaster trends 2007-2021



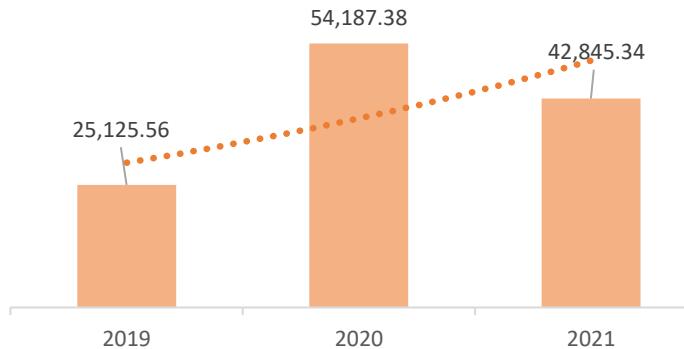
Disasters Impact to PLN



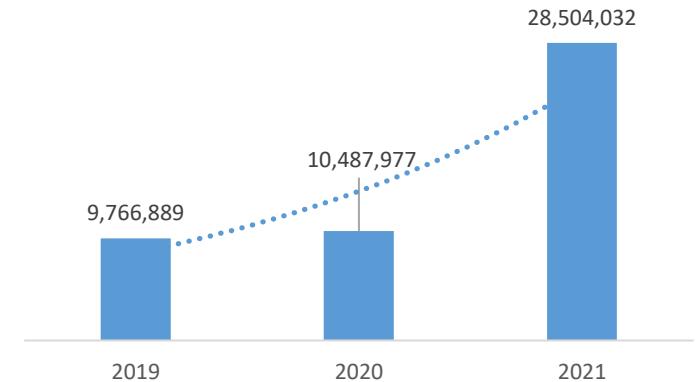
PLN



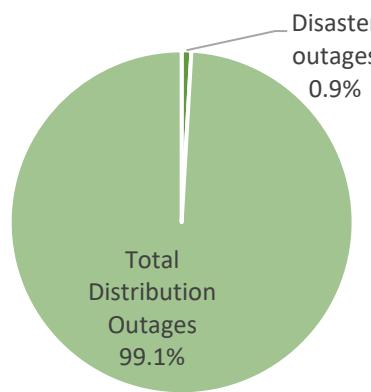
Number of outages trends by disaster 2019-2021



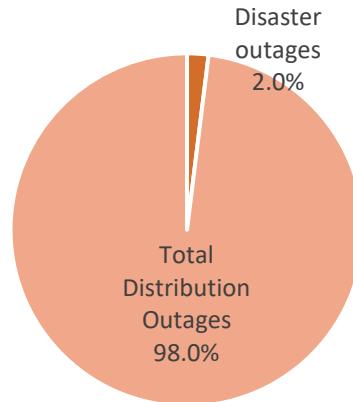
Duration of outages trends by disaster 2019-2021 (hours)



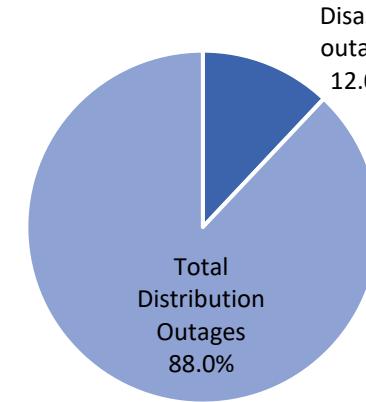
ENS of outages trends by disaster 2019-2021 (kWh)



Number of outages by disaster 2021 (%)



Duration of outages by disaster 2021 (%)



ENS of outages by disaster 2021 (%)

Disaster Life Cycle



Mitigation: Disaster mitigation work involves directly preventing future emergencies and/or minimizing their negative effects. It requires hazard risk analysis and the application of strategies to reduce the likelihood that hazards will become disasters.

Disaster preparedness: Disaster preparedness efforts include plans or preparations made in advance of an emergency that help distribution company get ready.

Disaster response: Disaster response/ disaster relief work includes any actions taken during or immediately following an emergency, including efforts to save lives and to prevent further property damage.

Disaster recovery: Disaster recovery happens after damages have been assessed and involves actions to return the affected property to its pre-disaster state or better – and ideally, to make it less vulnerable to future risk. Risk identification includes understanding the nature of hazards as well as understanding the nature of vulnerabilities.



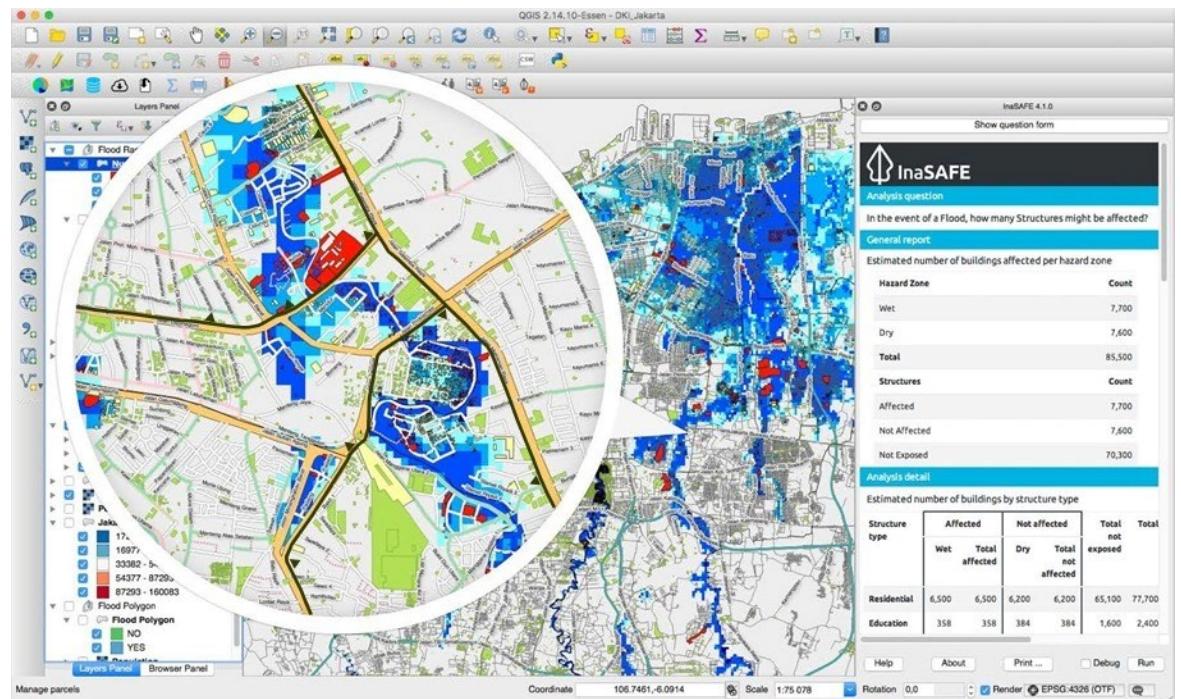
Mitigation and preparedness

InaSAFE & GIS Utility Mapping Integration



InaSAFE is Free and Open Source Software (FOSS) project that produces **realistic natural hazard (flood, earthquake, tsunami, landslide, wildfire, abration, volcanic eruption) impact scenarios** for **better planning, preparedness and response activities**. It provides a simple but rigorous way to combine data from scientists, local governments and communities to **provide insights into the likely impacts of future disaster events**.

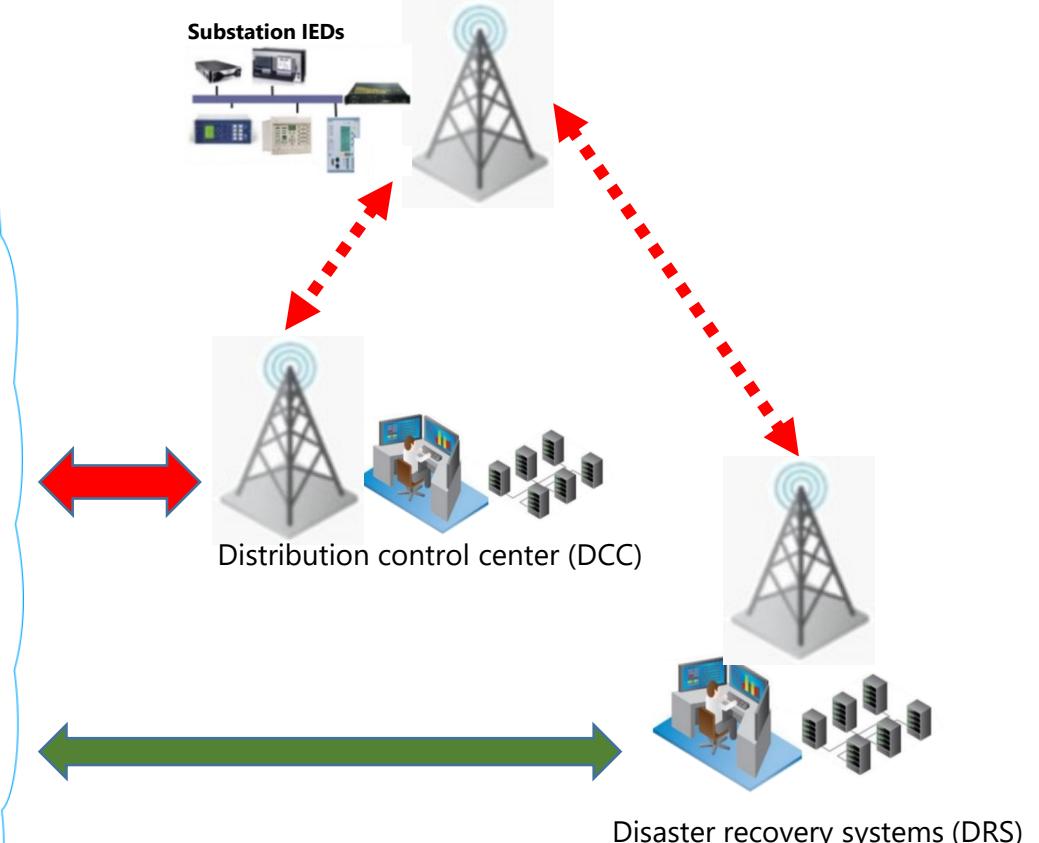
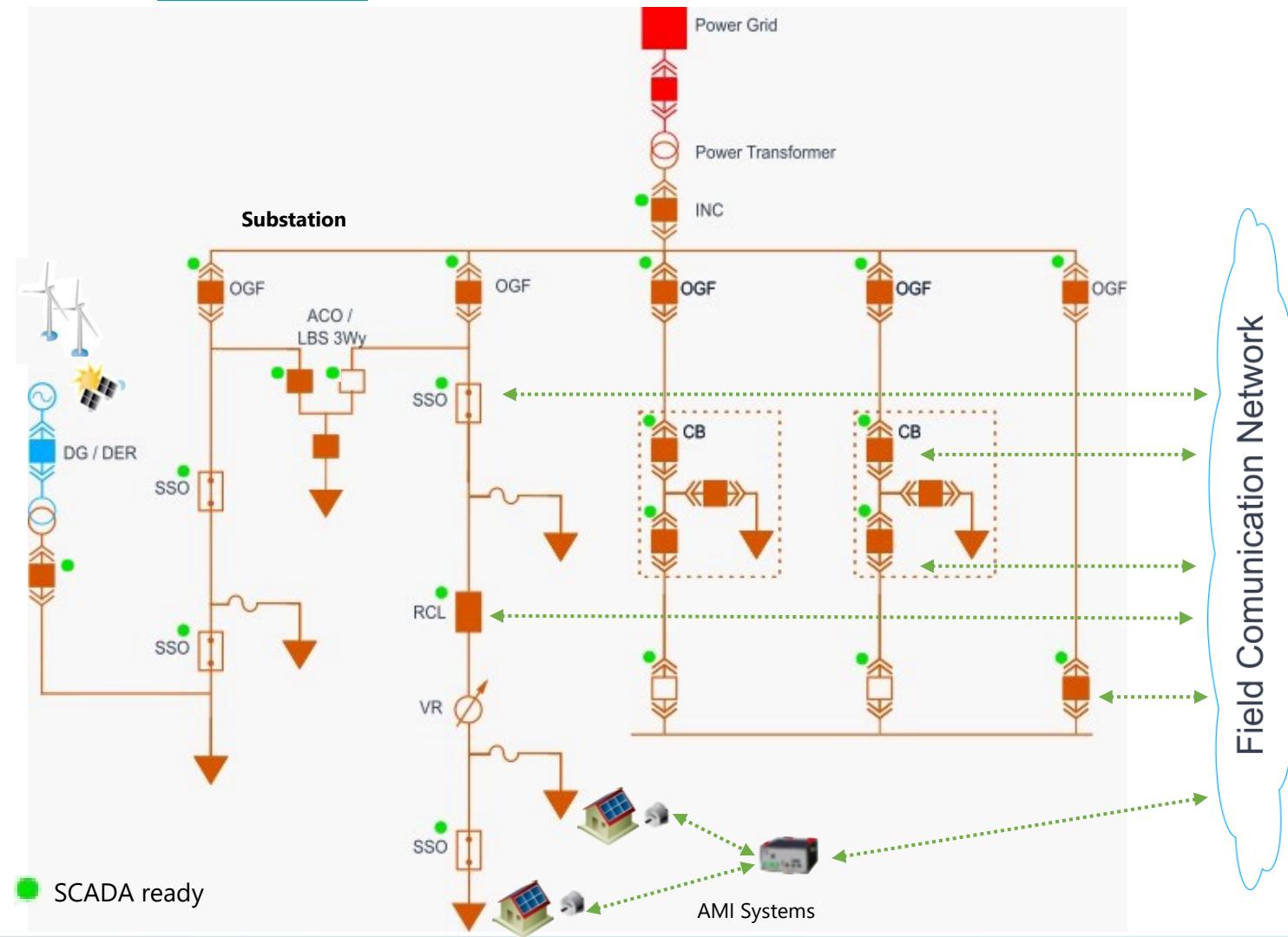
InaSAFE is free software that was developed jointly by Indonesia ([BNPB](#)), Australia ([Australian Government](#)) and the World Bank ([GFDRR](#)).



Distribution Network Configuration & Control



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Disaster Recovery Systems (DRS)



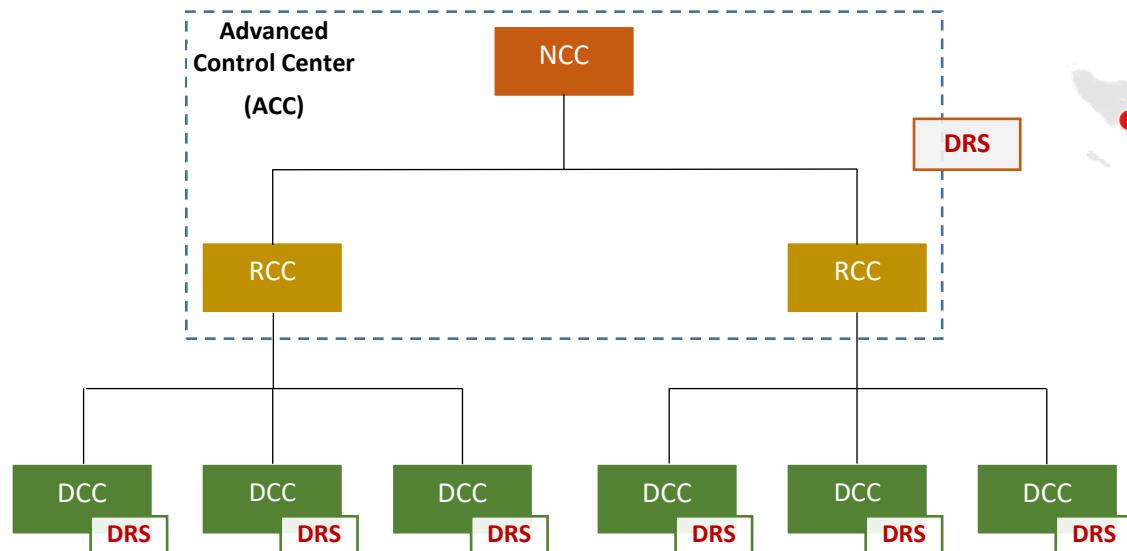
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NCC : National control center (500/275 kV)

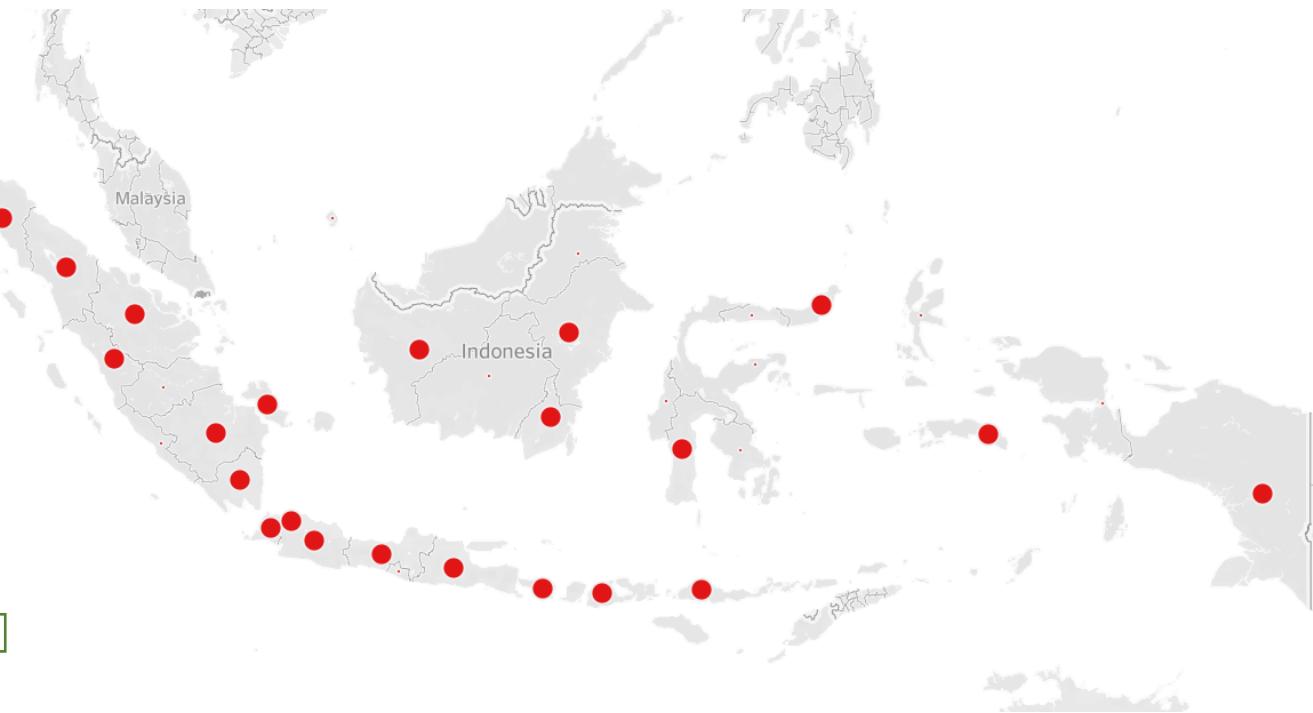
RCC : Regional control center (150/66 kV)

DCC : Distribution control center (20 kV)

DRC : Disaster recovery center



Disaster recovery center (**DRC**) at all level of **control center**



22 Distribution control center (**DCC**) to **7** disaster recovery systems (**DRS**),
15 DRC in planning.

Defence Scheme Transformation



Static Defense Scheme

Dynamic/Adaptive Defense Scheme (DDS)

1. **Static target** is used in existing Defense Scheme where **the actual load is dynamic.**
2. **Inaccuracy of load shedding targets** in existing OLS Scheme.
3. **The growth of system grid** (due to new generators, IBT's and transmission lines) causes existing **static defense schemes ineffective.**
4. **ENS** (energy Not Served) is **lowered** by **reducing total unsold energy**
5. Some **blackouts** were **occurred** due to **island operation scheme** (UFR island contingency or N-2) failure.

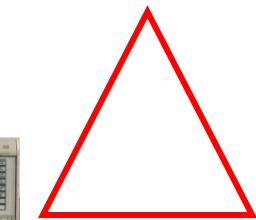
1. Load shedding is calculated and **executed in real-time**
2. **High accuracy** in load shedding **calculation**
3. **Configurable targets** to align with **customers priority**
4. **Fast processing time** so that island operation scheme may executed successfully
5. Logical schemes of DDS is easy to **adapt dynamically** to **latest system grid configuration**
6. A web based **Dashboard** is provided to **monitor actual load, arming targets, and devices availability** (protection relays, telecommunication link, and SCADA)
7. DDS uses **data communication protocol** for **apparatus status** (CB, DS, Blocking status) and **GOOSE protocol** for **targets executions**
8. **Independent and dedicated communication link with loop system**



Master Station



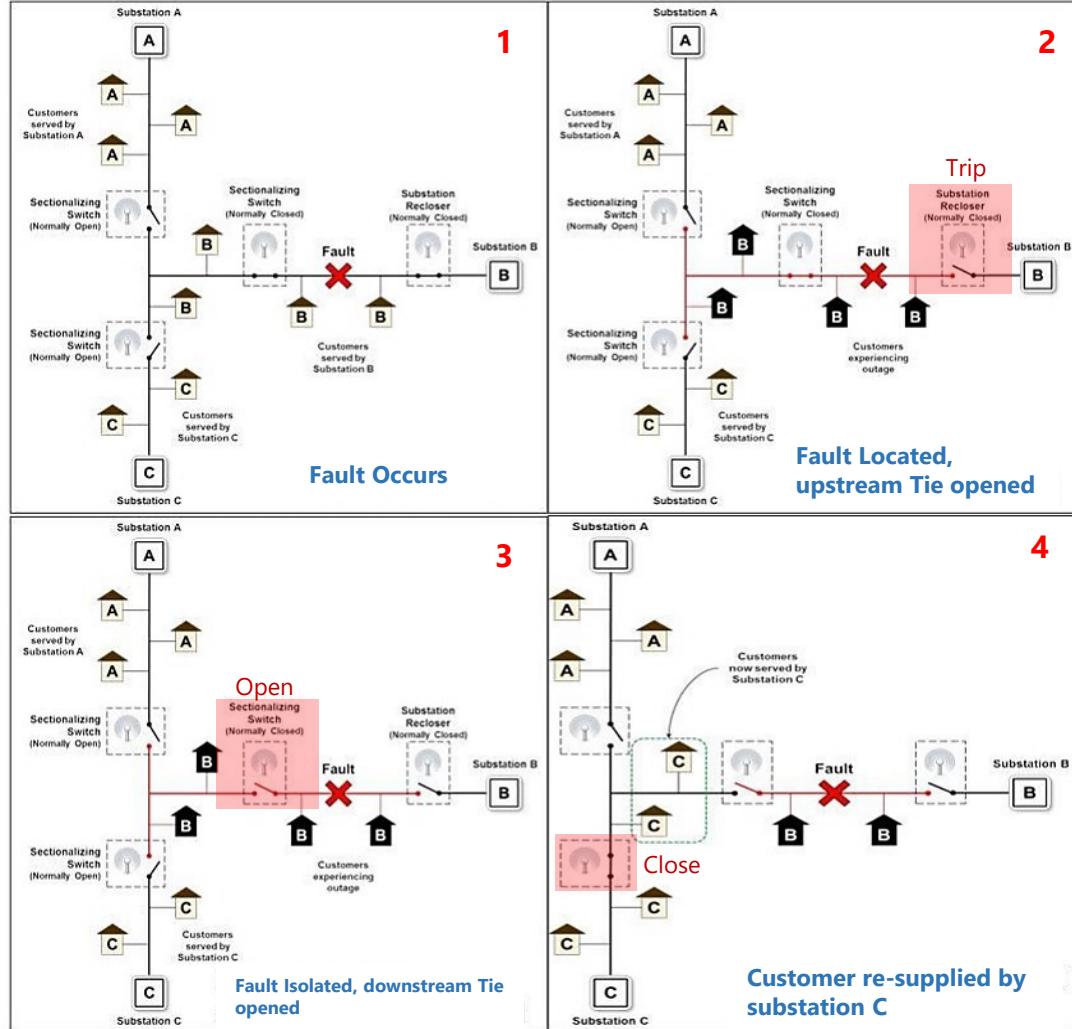
Relay Defense Scheme (RDS)



Dynamic/adaptive defense scheme (DDS) Server

6 Distribution control center (**DCC**) **ready** for dynamic defence scheme (**DDS**) on **feeder load shedding target**.16 DCC in planning.

Fault location, insulation, and service restoration (FLISR)



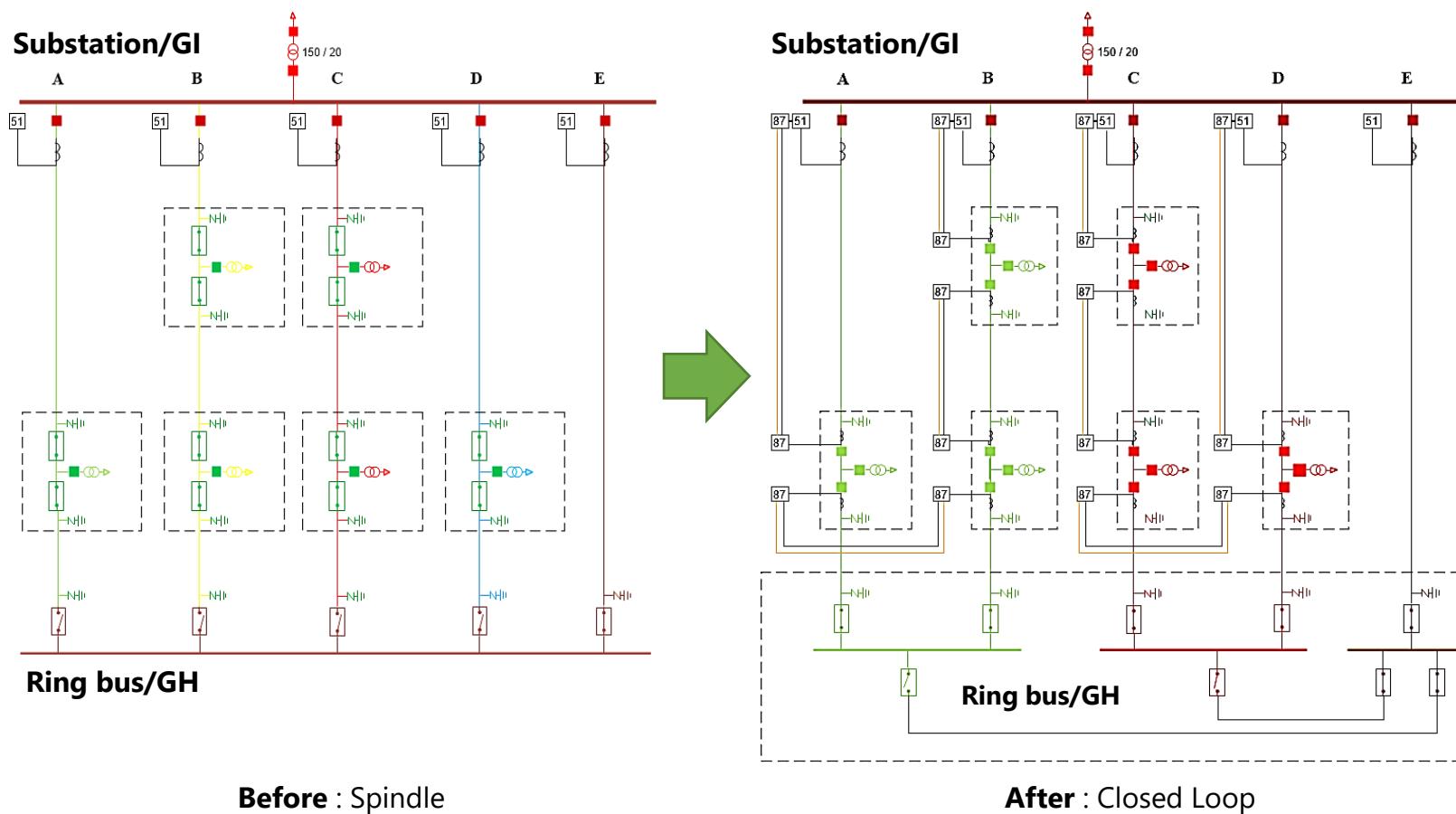
FLISR applications can **reduce the number of customers impacted** by a **fault** by **automatically isolating** the **trouble area** and **restoring service** to **remaining customers** by transferring them to adjacent circuits.

The fault isolation feature of the technology can **help crews locate the trouble spots more quickly**, resulting in **shorter outage durations** for the **customers impacted by the faulted section**.

The **reduced number of customers interrupted (CI)** and the associated **customer minutes of interruptions (CMI)** are the primary measured benefits of the technology.

15 Distribution control center (**DCC**) **ready** for fault locator, isolation, and service restoration (**FLISR**) modul. 7 DCC in planning.

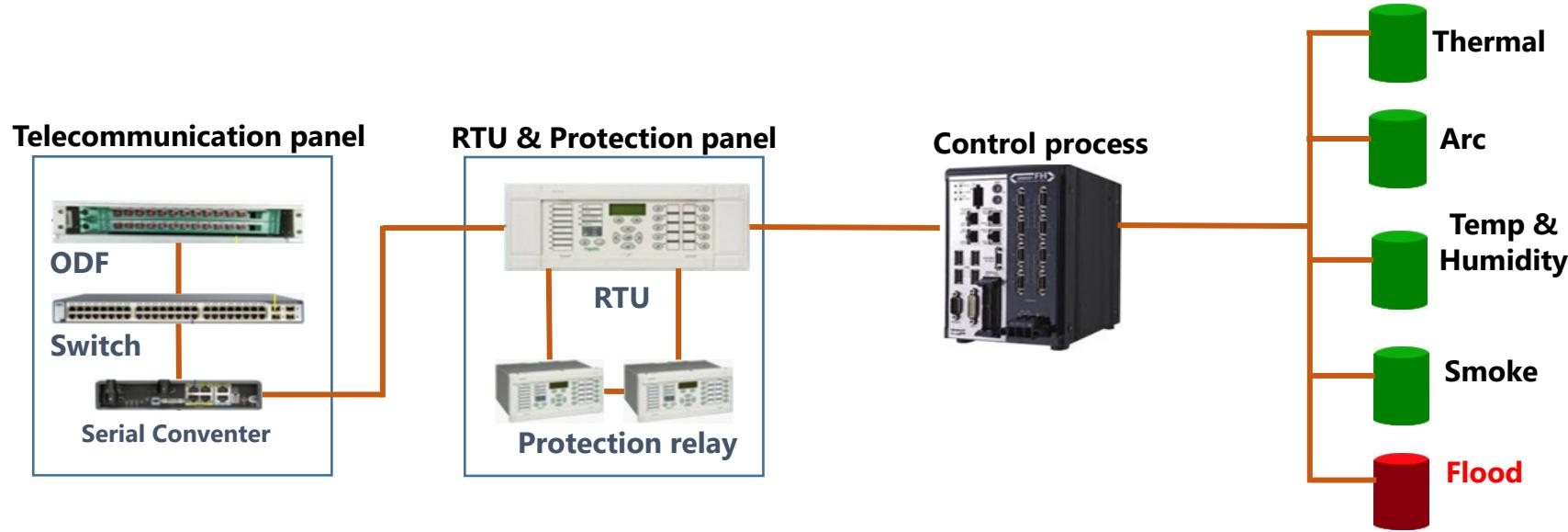
Zero Down Time (ZDT) Network Configuration



ZDT is the **network configuration** for **high priority service area**.

1. MV network topology:
parallel - closed loop
2. Communication network: redundant
Fiber Optic (FO)
 - a. Protection communication link
 - b. SCADA communication link
3. Protection systems:
 - a. Main : 87L (LCD)
 - b. Backup: 67 (Directional OC/GF)
4. Early warning system (EWS)

Early Warning Systems at MV Cubicles



The use of early warning systems (EWS) allows utilities to respond more quickly to emergencies, minimizing the impact of disasters on property and save lives.

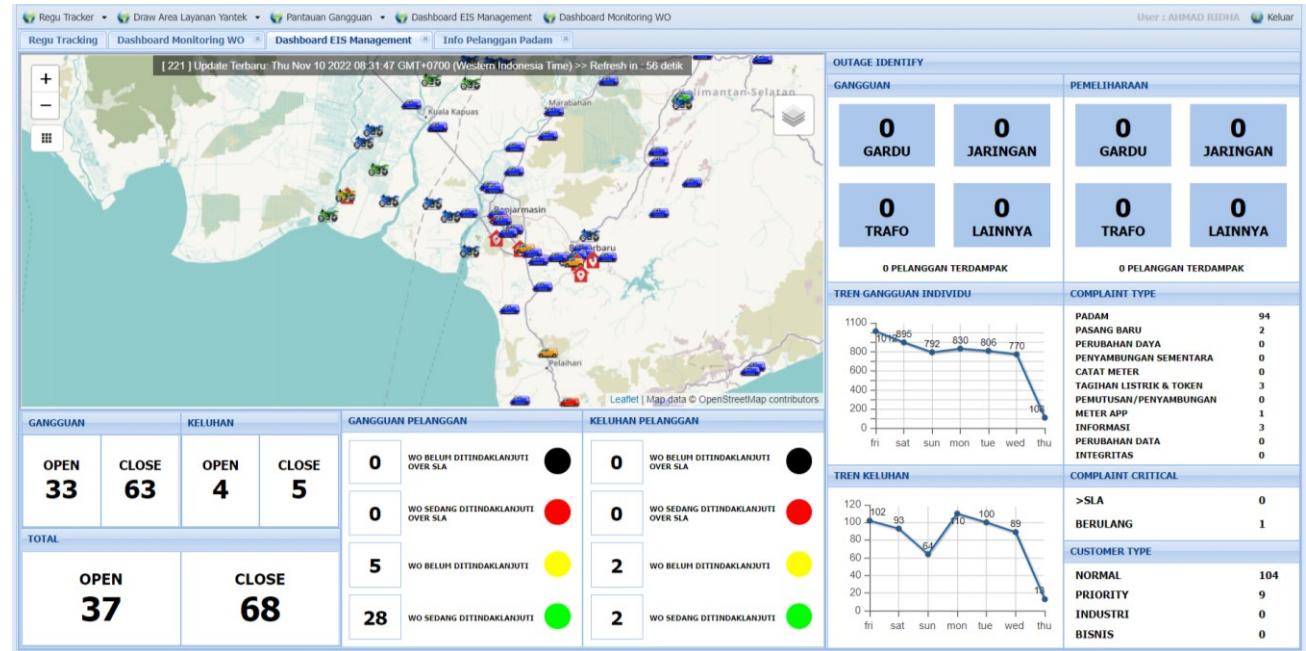
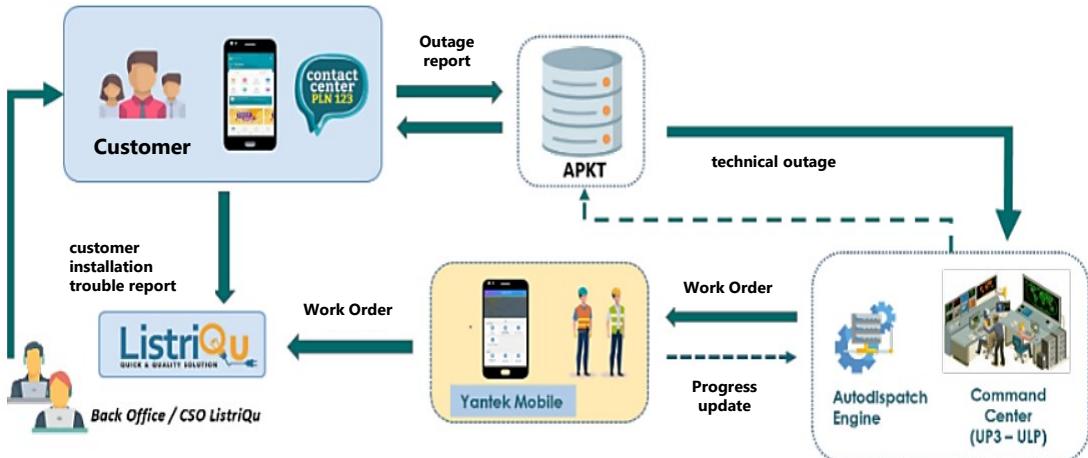
Response and recovery



Outage Management Systems (OMS)



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Dashboard M-APKT

- Outage management
- Workforce Management
- Customer information Systems
- Automated Vehicle Location

Indonesia Digital Innovation & Achievement Award 2022



PLN



**PT. PLN
Nusantara Power**
Best Digital Innovation
in Electricity Energy
2022

PT. PLN (Persero)
Best Digital Technology
in Energy Services 2022

Darmawan Prasojo
Best CEO
Indonesia Digital
Innovation & Achievement
of The Year

PT. PLN ICON+
Best Digital Innovation in
Telecommunication
Services 2022

PT. PLN ICON+
Best Overall Indonesia
Digital Innovation and
Achievement in
Telecommunication
Services 2022



Darmawan Prasojo
President Director

Response & Recovery (1)



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Flood at Banten



Flood at Pelaihari



Flood at Banjarbaru



Landslide at Barabai



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Response & Recovery (2)



PLN



Flood at Luwu



Tsunami at Pandeglang



Flood at Semarang



Flood at Jakarta

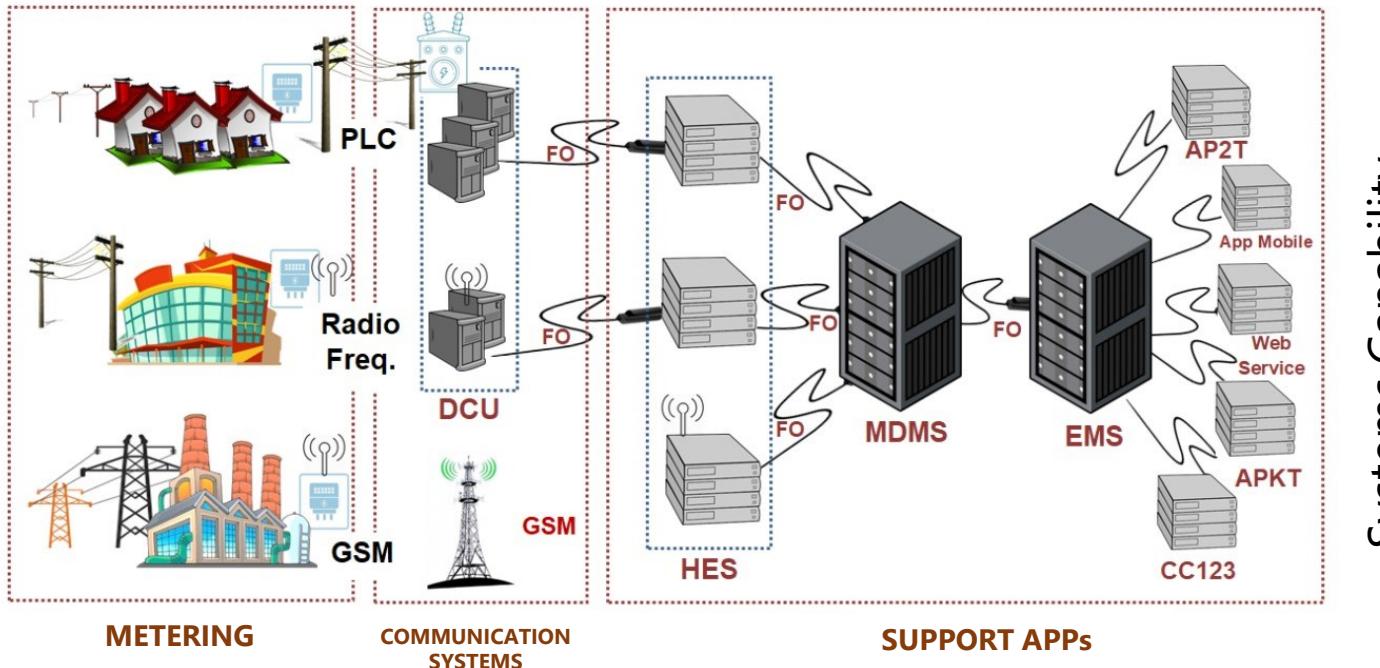


Earthquake at Palu

Thank You



Advanced Metering Infrastructure (AMI)



AMI is a combination of measurement devices, two-way communication for near real-time information provision (energy, voltage, current, etc.), monitoring (power quality & condition) and control. AMI is an extension of AMR for automatic meter reading with additional capabilities for dynamic tariff implementation and Home Area Network connections.

Until **2021, 114.782** meters have been **integrated** into the **AMI** system.

Smart Electricity - Prepaid Meters



Refill solution from PLN since 2010. This is the innovation from PLN services that promises ease, freedom and comfort for customers. Smart Electricity allows customers to monitor electricity consumption daily and at all times.

Purchases of Smart Electricity tokens or pulses can be made at more than 30,000 ATMs throughout Indonesia and at online electricity payment counters.

Prepaid meters play an important role in **reducing** the level of **customer receivables**, especially in **disaster-affected areas**.