QEd – Quantum Edge device

Electrification, distributed generation and digitization are disrupting electric distribution

Electrification

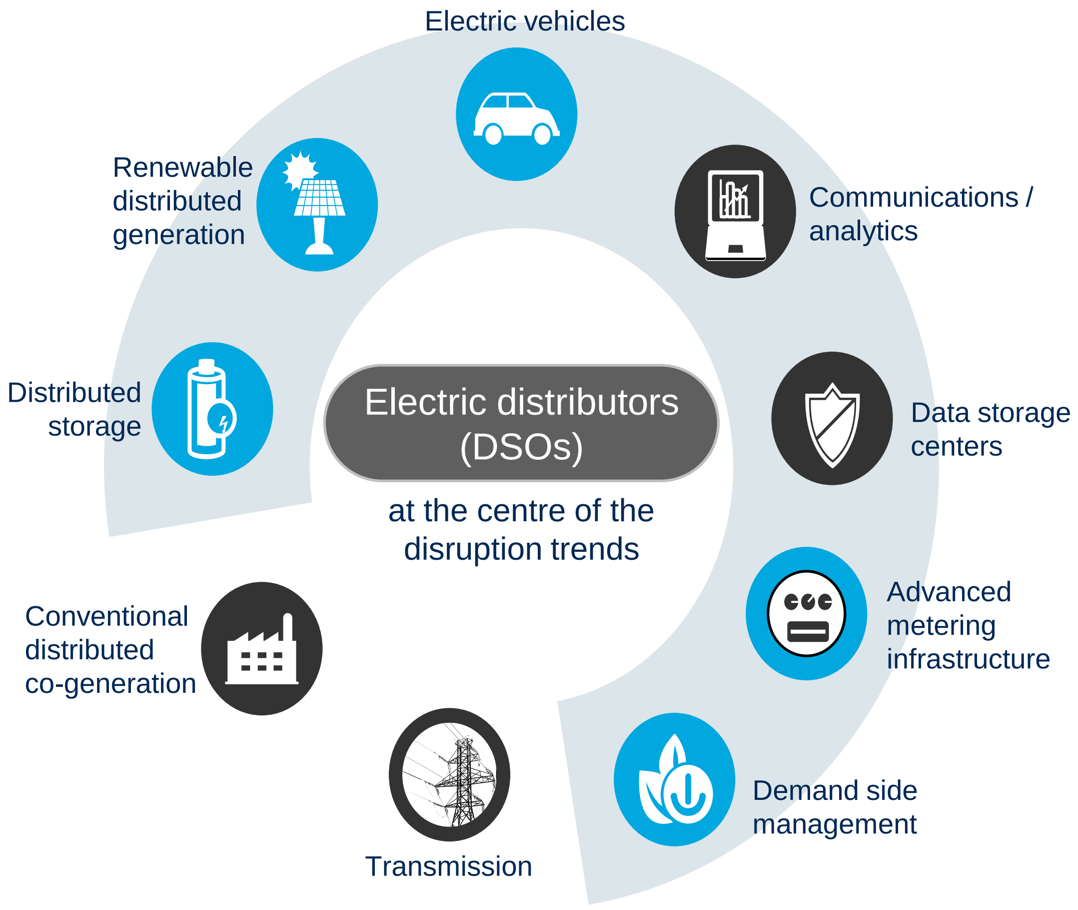
Electricity expected to rise to **~50%** of total **energy consumption** by 2050 from current ~20%, with increasing penetration of **electrical mobility** (>90% of all road vehicles)

Distributed Energy Resources

By 2050 RES will reach >65% of total energy supply and building's energy demand will double due to HP and direct electric heating adoption

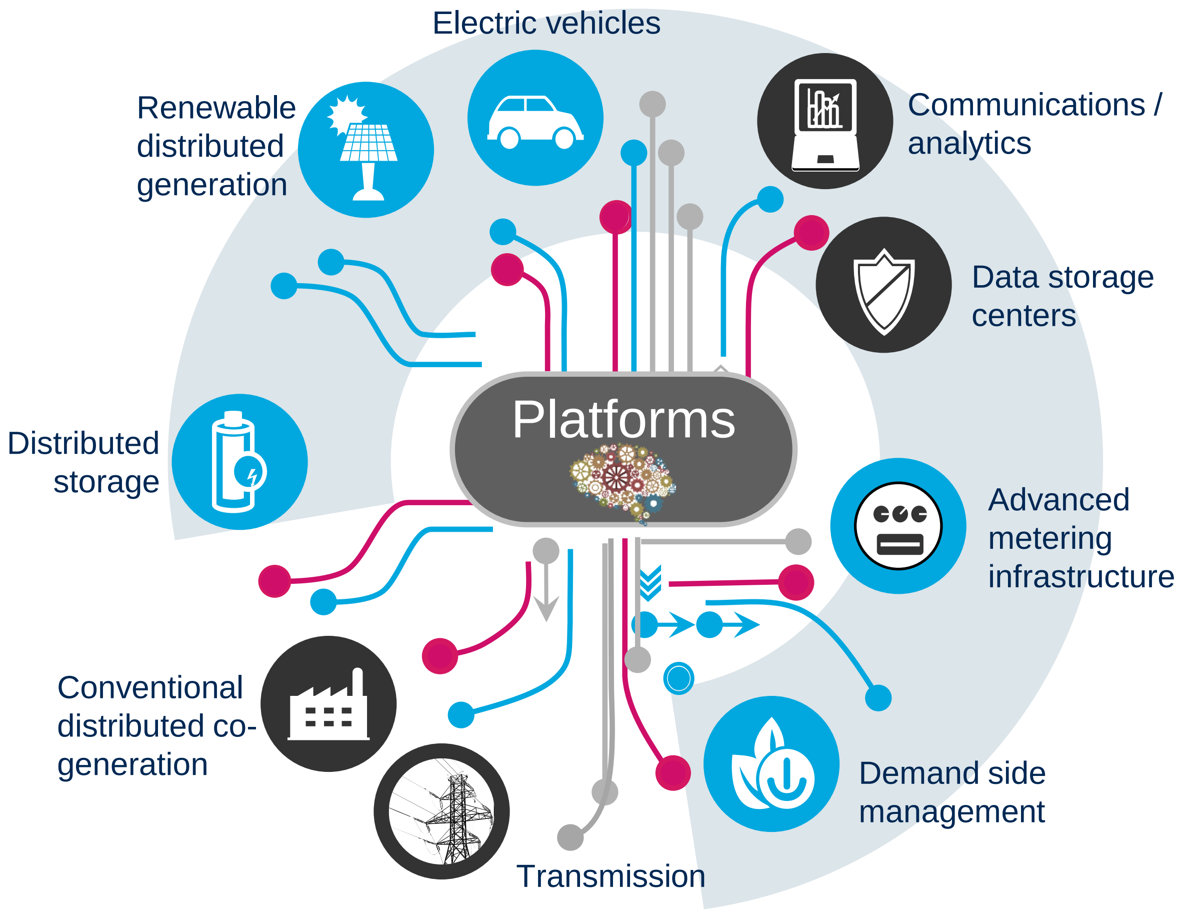
Digitization

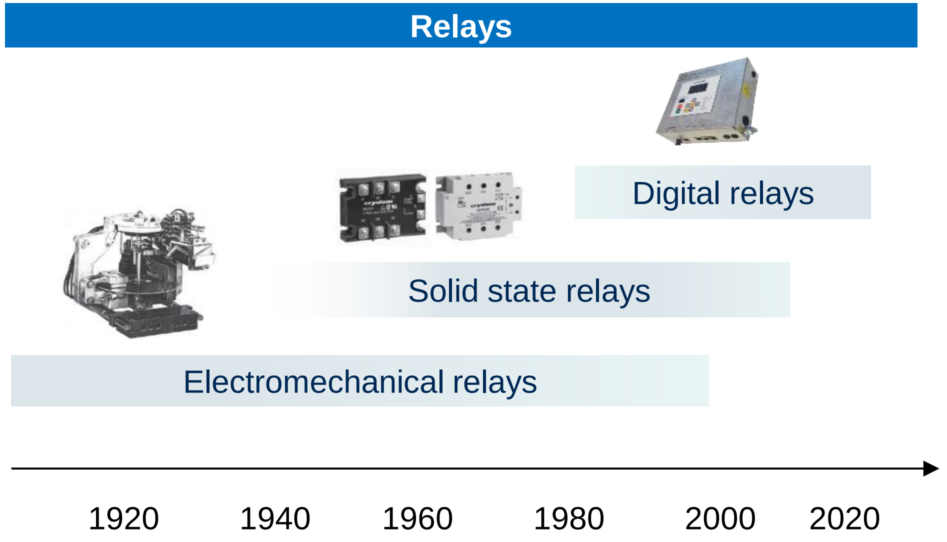
Computing power now available at **low unit cost** supporting distributed **"edge"** intelligence deployment

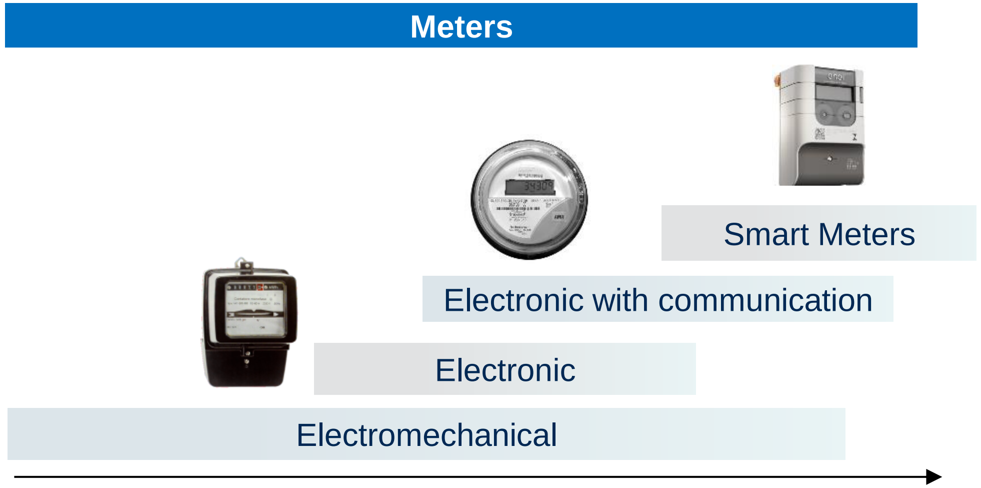


Note: DSO: Distribution System Operator, RES: Renewable Energy Resources; EV: Electric vehicles; HP: Heat Pumps
Source: World Energy Outlook 2021 (WEO), BNEF Power Grid Outlook 2021

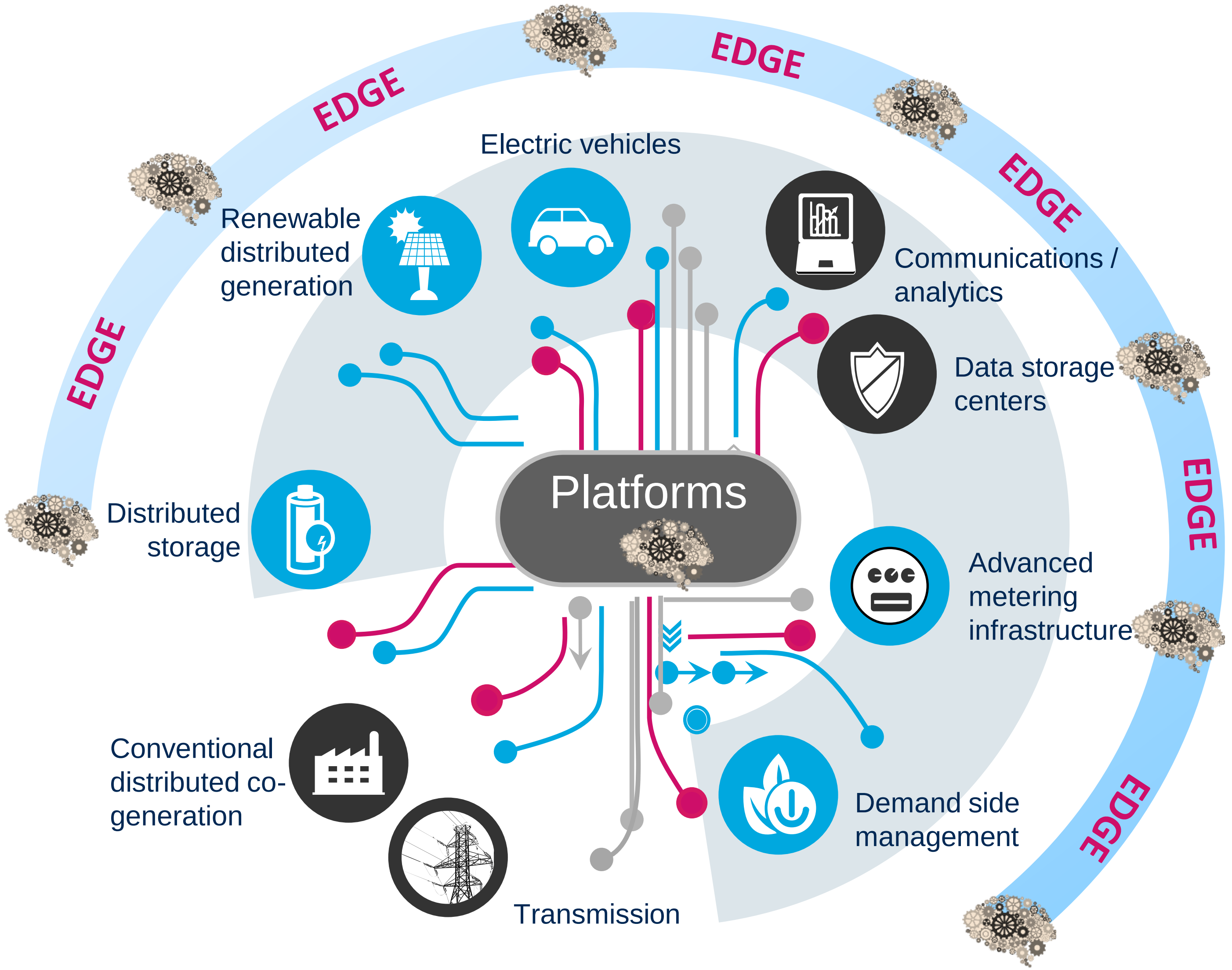
Power Distribution Grids: Platform







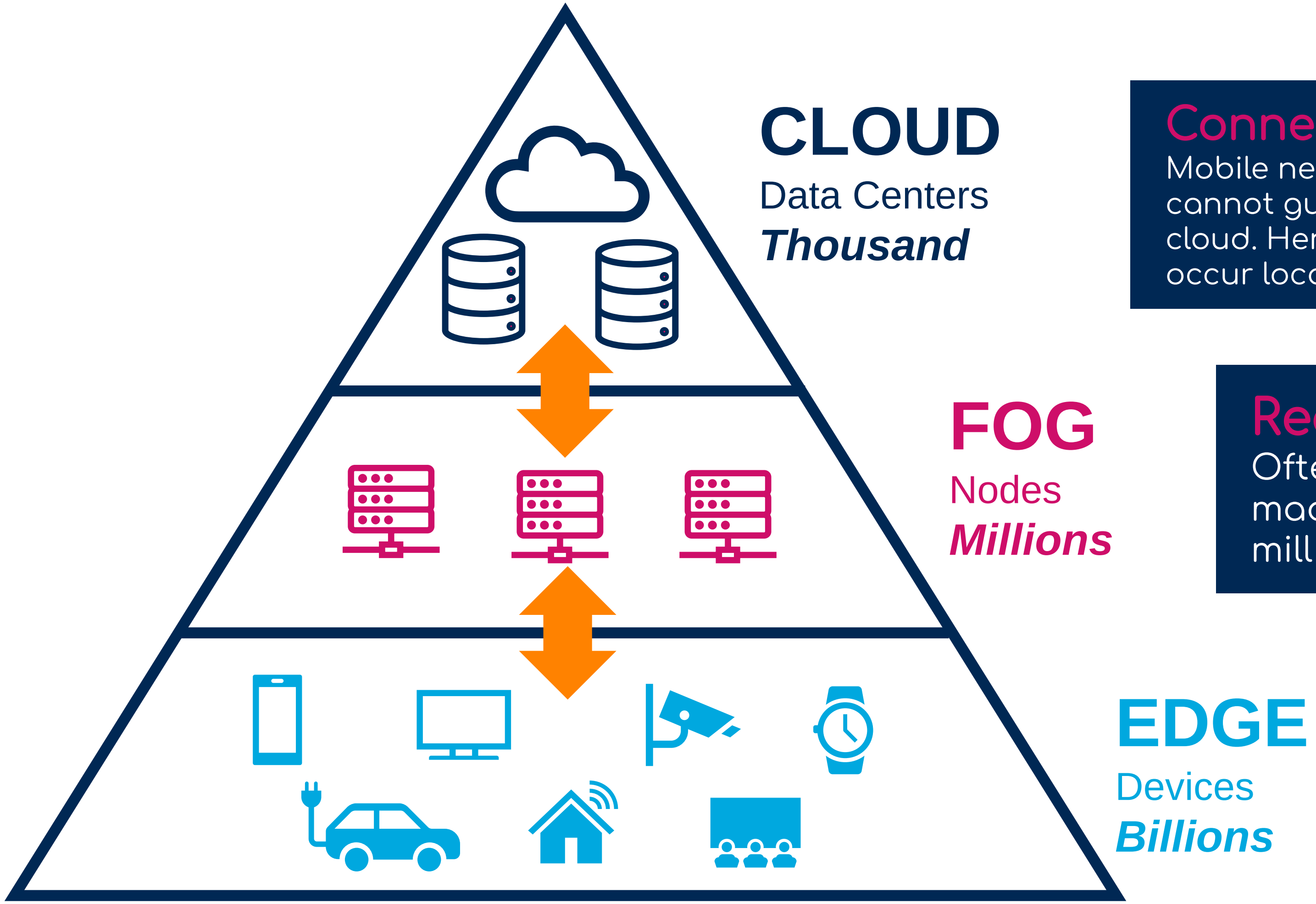
Power Distribution Grids: on the edge



- Enables to run **key functionalities** directly **on the edge**
- **Virtualizing** an increasing number of business services **in a simple way**
- **Decentralized** computational capability and edge **multi-purpose platform**
- **Co-design solutions** to expand functionalities and accelerate the digital transformation of grids

Edge Intelligence

Fog computing is a term for technology that extends cloud computing and services to the edge of an enterprise's network. It allows data, applications, and other resources to be moved closer to, or even on top of, end users.



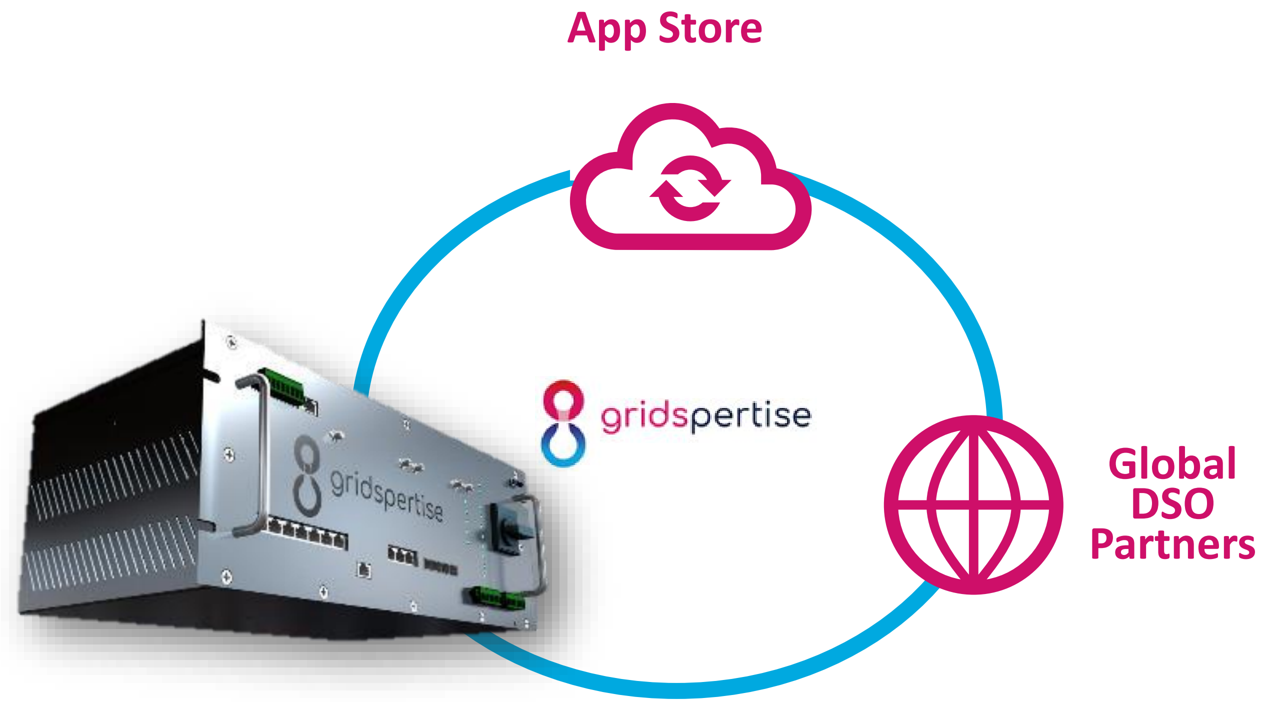
Connectivity:
Mobile networks are often spotty and cannot guarantee connectivity to the cloud. Hence decision making must occur locally.

Real-time:
Often decisions need to be made within tens of milliseconds.

Data volume:
The amount of data generated by sensors can be huge

The disruption of the cloud model is not the displacement of the cloud but rather its extension to the edge.

QEd®: The all-in-one solution for your smart grid in a fully electric future



Our Revolutionary Solution

A revolutionary all in one solution: thanks to its **virtualization technologies** and decentralized computational capability, it **integrates key grid functionalities** while reducing the number of physical components required in the substations, **making networks more efficient, sustainable and reliable.**

The Quantum Edge Device® provides a **cutting-edge multi-purpose hardware platform** with **automotive grade application processors**, a **standard operating system** and an ecosystem of **customizable applications**

QED Hardware

A powerful hardware to deliver advanced functionalities while keeping unmatched flexibility

Processing

- Octa-Core ARM 64 bit processor @ 3GHz
- **8 GB** of embedded RAM
- 3x Digital Signal Processors
- **Artificial Intelligence Engine**

Interfaces

- Smart terminations ® **Combined V/I MV sensors integration (LPIT)**
- **External actuators** (RIO actuators, MUs) for legacy equipment interoperability
- 8 programmable **digital I/O**

Industrial requirements

- **Extended** temperature range (25÷70°C)
- **Longer** time-to-failure (10+ years)
- **Long term support** (10+ years)
- **Cyber-secure** firmware loading
- Dual Power supply AC/DC

Communication

- **PLC** (CENELEC Band A / C + FCC + G3 PLC Hybrid ready)
- WiFi + **BLE 5 + LTE/5G ready**
- **Radio Frequency** (169MHz)
- **RF SRD** (868 – 920 MHz)
- **Ethernet Switch** Copper/Fiber

Improve grid reliability

gridspertise

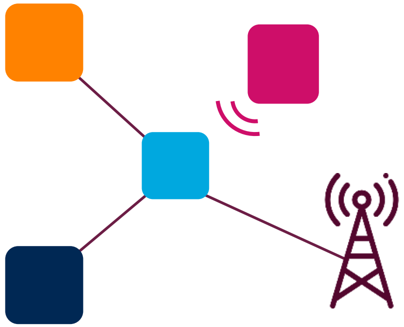
A revolutionary solution for Improving grid reliability with multiple use-cases while optimizing CAPEX and OPEX investments

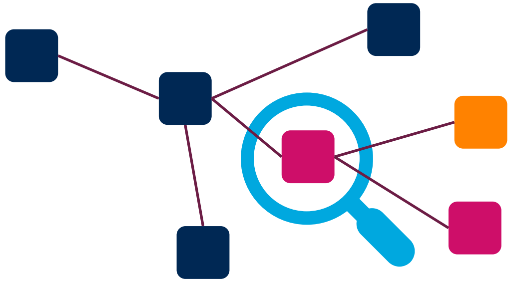
Virtualized IEDs (Intelligent electronic device)

Edge Applications

Improve grid reliability

gridspertise





PROTECTION, AUTOMATION AND CONTROL

- **MV Protection**
  ANSI 50/51, 50/51N, 67, 67N, 27, 59, 81, etc.
- **Embedded RTU**
  IEC60870-5-104 / IEC61850 GOOSE, etc.
- **BCU and Recloser Controller**
  Basic Bay Control and pole-mounted application

FAULT LOCATION:

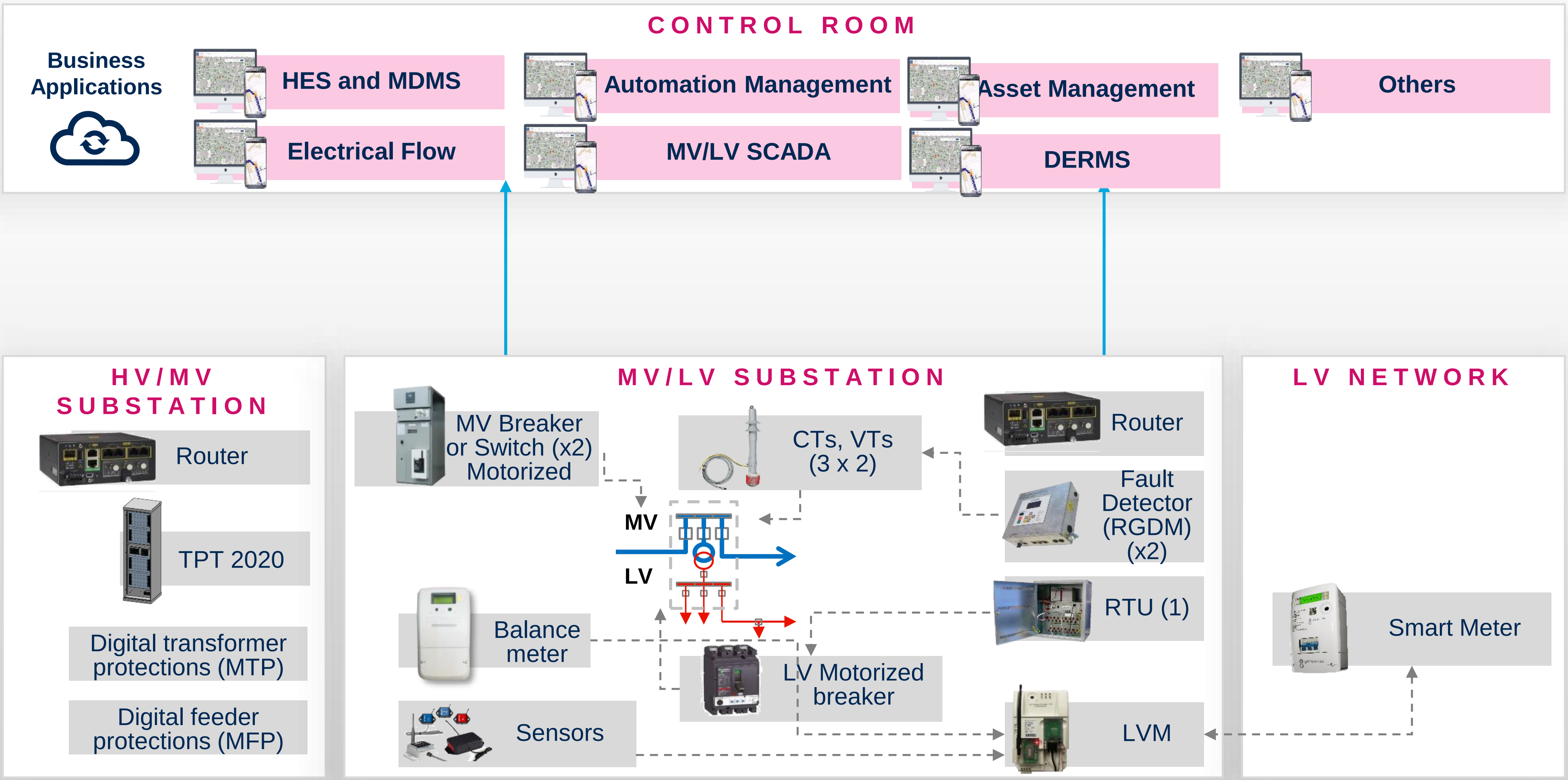
- Fault Passage Indicator
- Fault location protection function (ANSI 21)
- Fault location with Virtual PMU

SPECIFIC USE-CASES

- App for operational flexibility
- Dynamic Load shedding
- DERMS integration
- Peak shaving in case of BESS

QEd® empowers a major transformation of the MV/LV substation…

HW Devices   Software solutions



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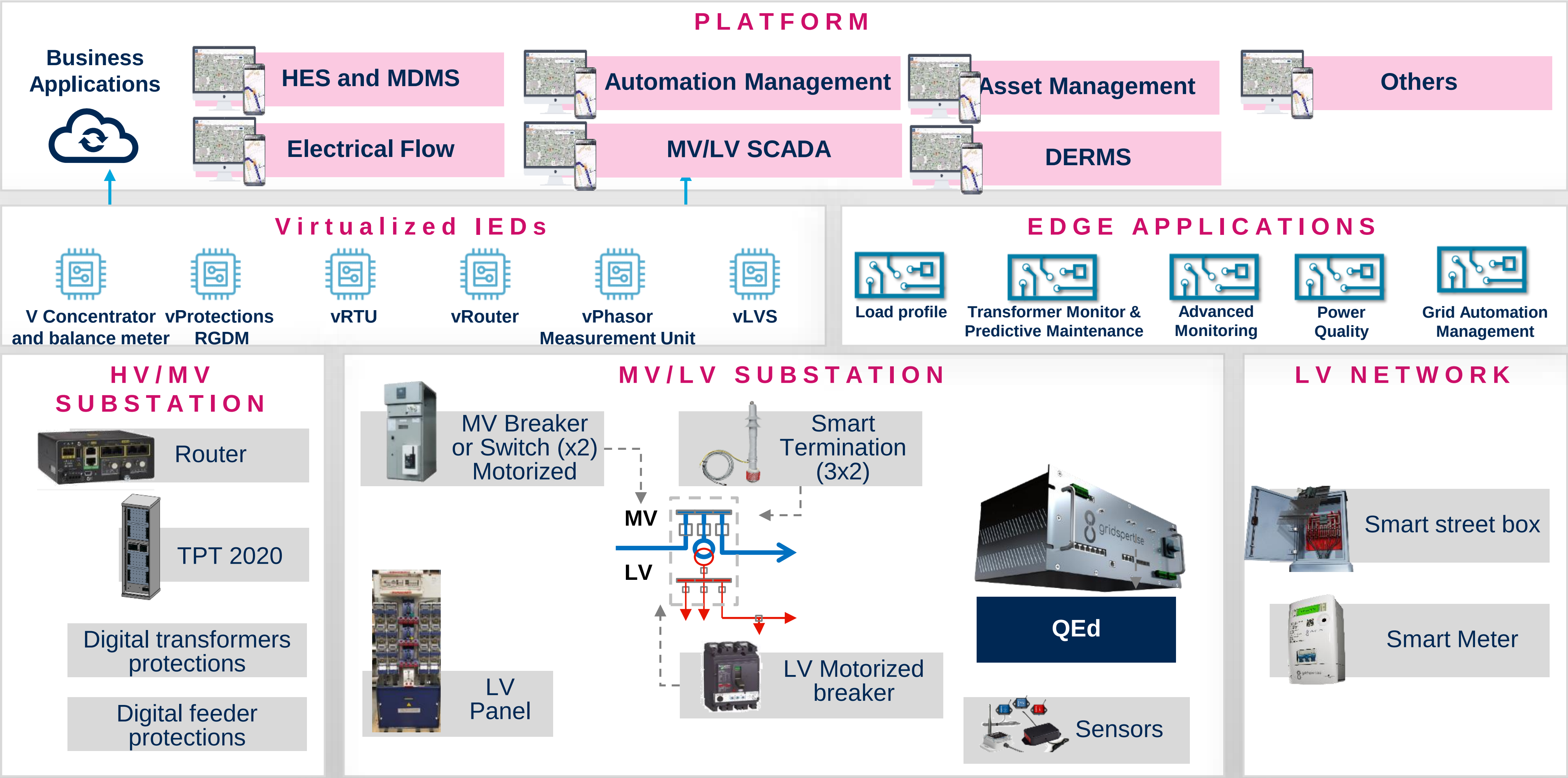
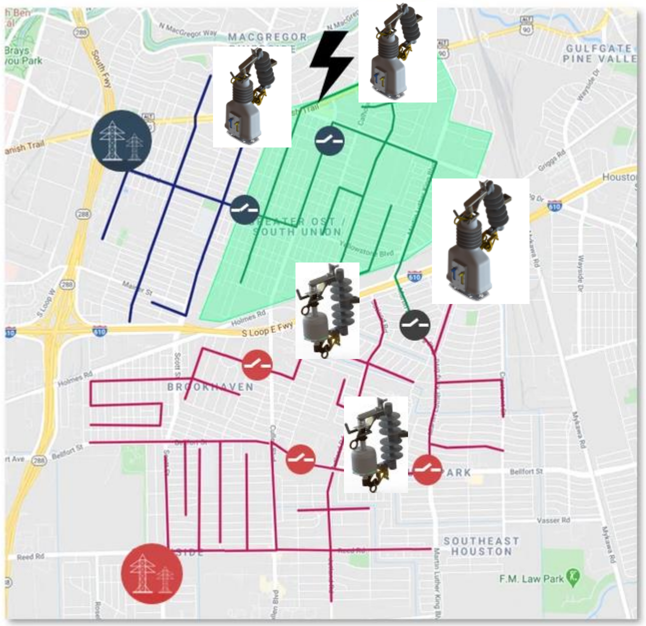
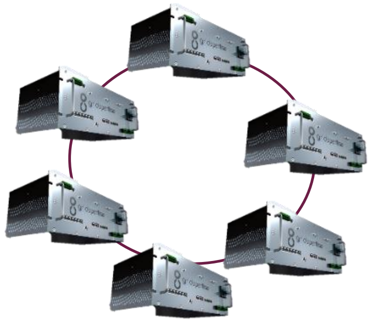
…while enabling new applications to run on the edge platform, also interacting with central systems

HW Devices Software solutions



Qed Applications in MV





Integration with PLATFORM

Grid Simulation & Planning	Advanced Metering Infrastructure
Electrical Flow	HES and MDMS
DERMS	LV/MV Monitoring

Grid Operations

MV/LV SCADA	Power Quality	Faults Locations
Outage & emergency management	Self Healing	Grid Automation Management MV/LV

QEd

VIRTUALIZED IEDs

- ✓Protections
- ✓Meter
- ✓Concentrator
- ✓Gateway LoRa
- ✓Router
- ✓Phasor Unit
- ✓Others…

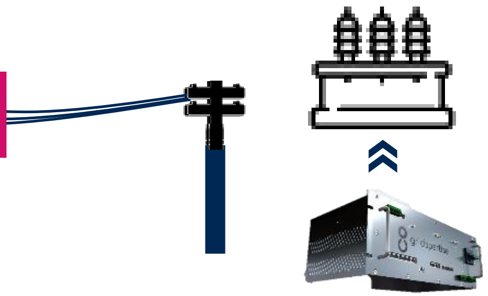
EDGE APPLICATIONS in THE QEd

✓ **IoT Sensors**
- Local communication with Fault location sensor

✓ **Metering Management**
- Meter data Management
- Load balancing
- Power Quality measurement
- Local model for energy load flow analysis and forecast
- Artificial Intelligence for anomaly and fraud detection

✓ **Grid Operations**
- MV Protection
- Remote Control
- MV Real-time Self-Healing
- Fault Passage Indicator
- Micro SynchroPhasor Measurement

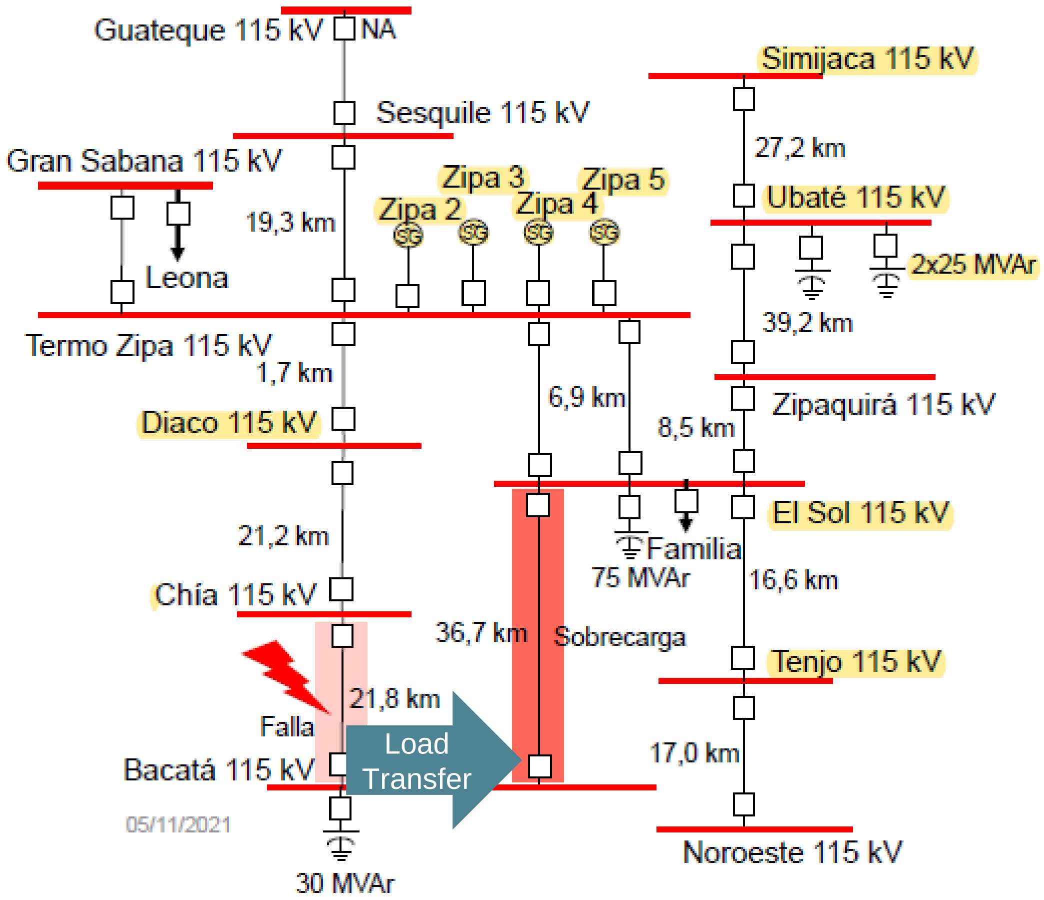
EDGE



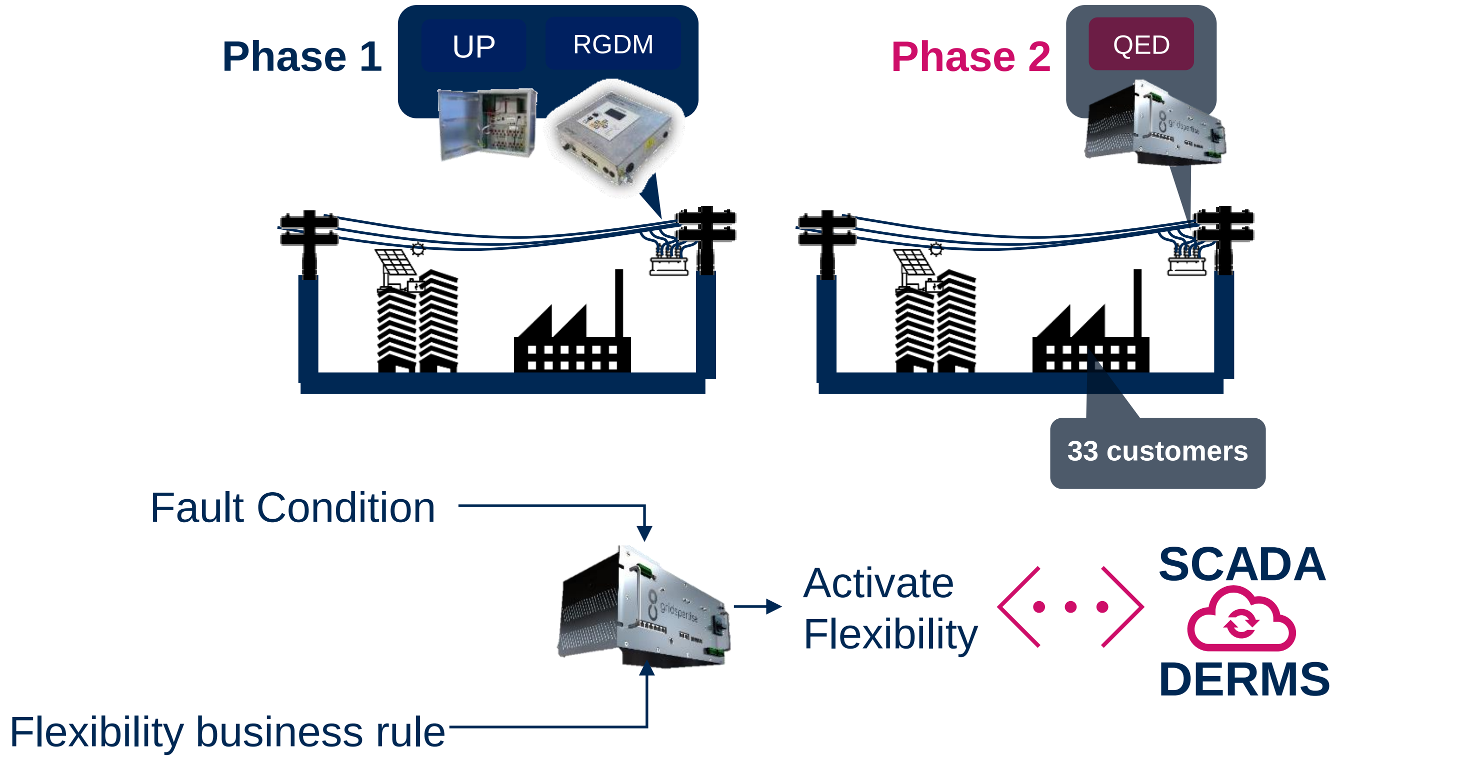
FlexApp

•**322 K customers affected during contingency, with a total demand of 334 MVA**

•33 represent enough power to enable needed load transfer without line saturation.



QED Application



FLEXIBILITY and DERM

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Flexibility Use-cases

- Edge Load-shedding
- Edge peak-shaving
- MicroGrid Controller
- DER gateway

UTILITY OPERATIONS CENTRAL SYSTEM

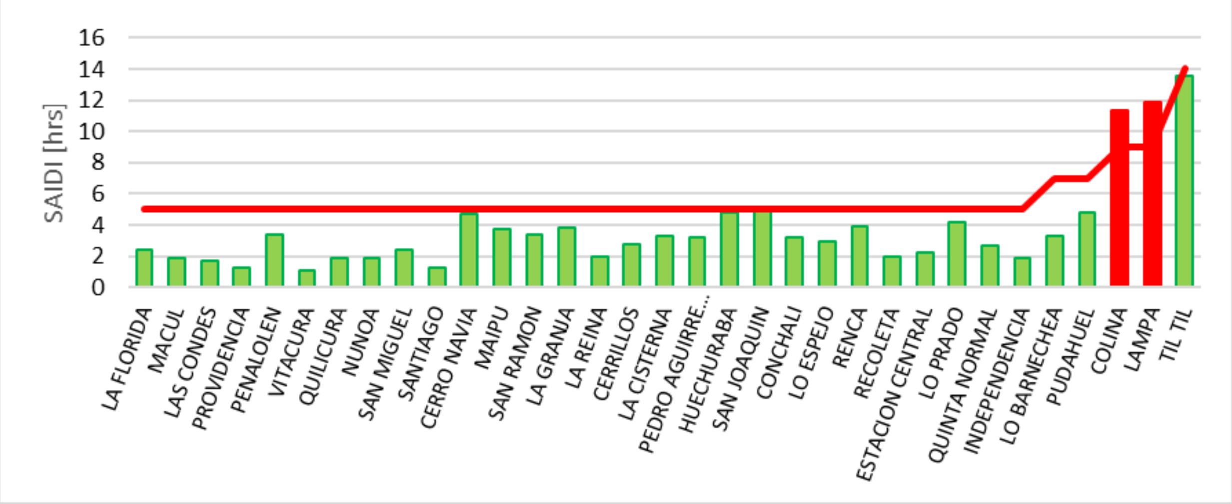
DERMS

Gridspertise Open Platform

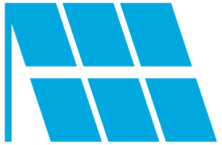
EDGE APPLICATIONS in THE QEd

Automation Management	Demand side management	Flexibility business rule

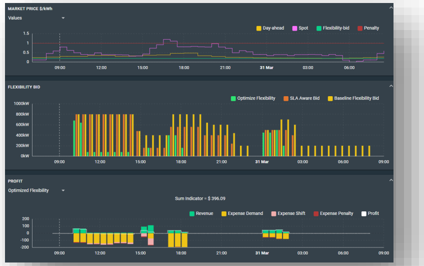
QEd with DERMS
Distributed energy resources management system

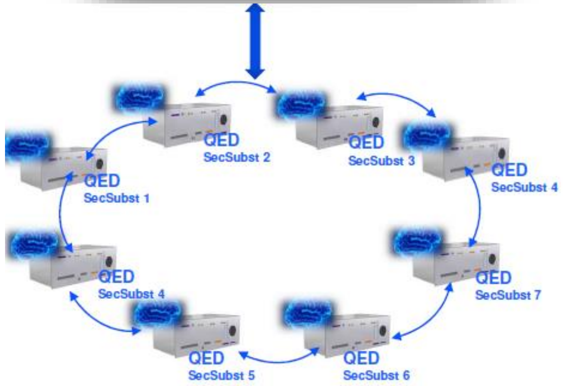


High penetration of solar energy



Microgrid on Grid





…QED

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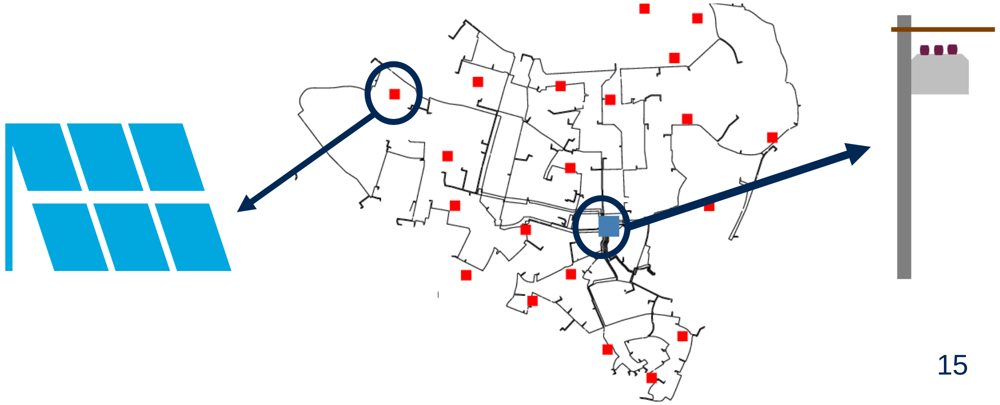
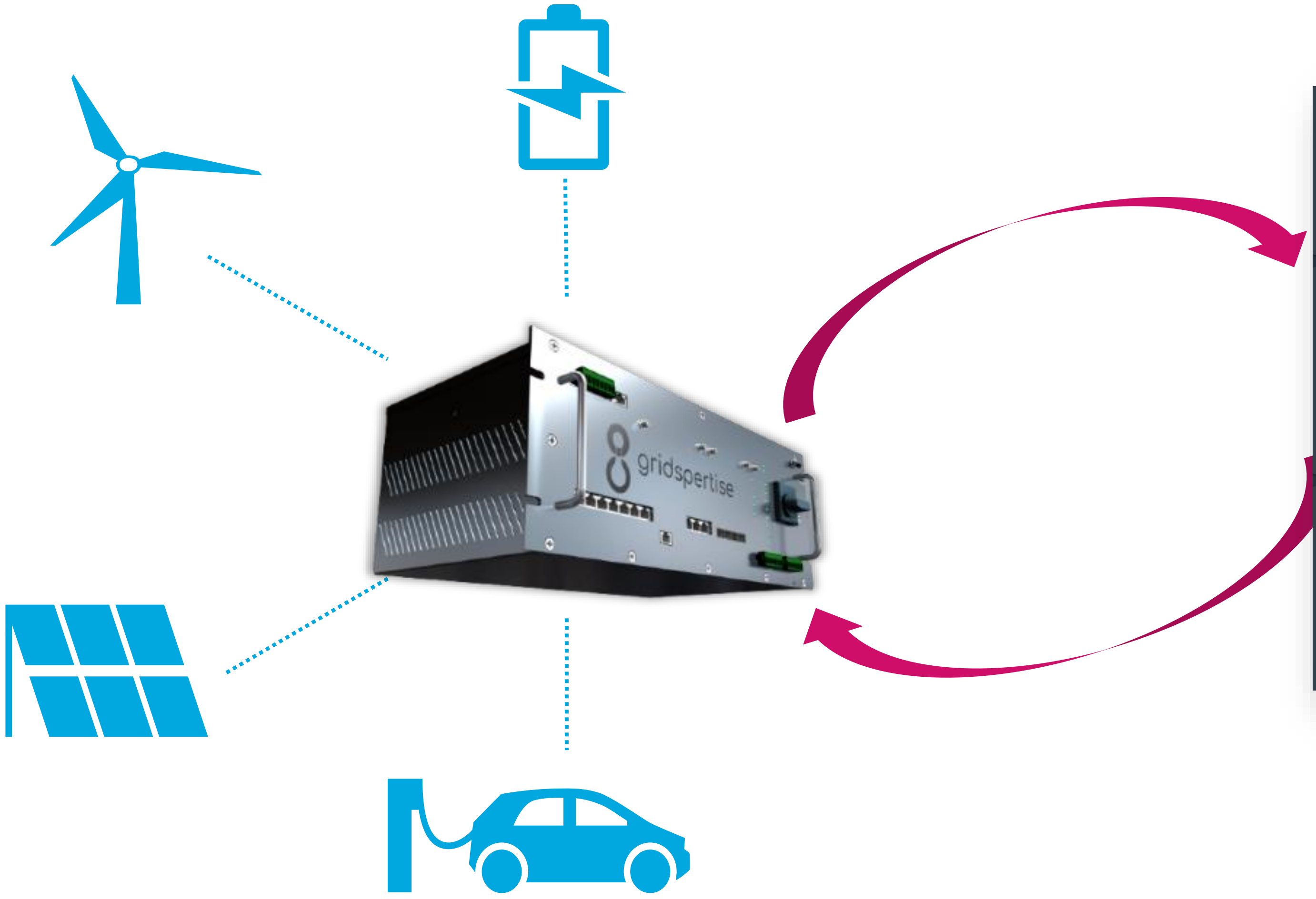
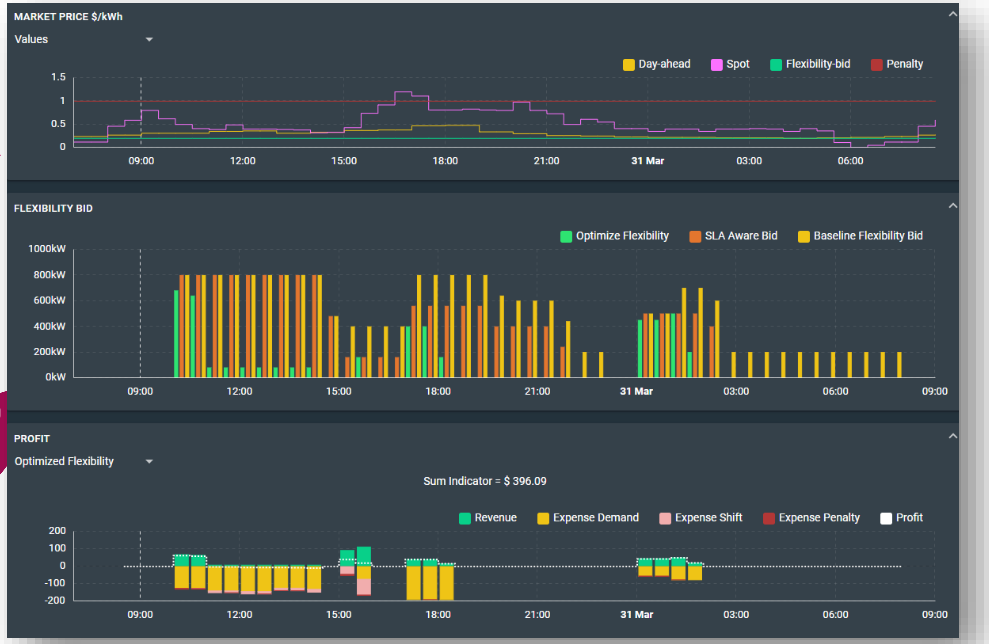


QEd with DERM

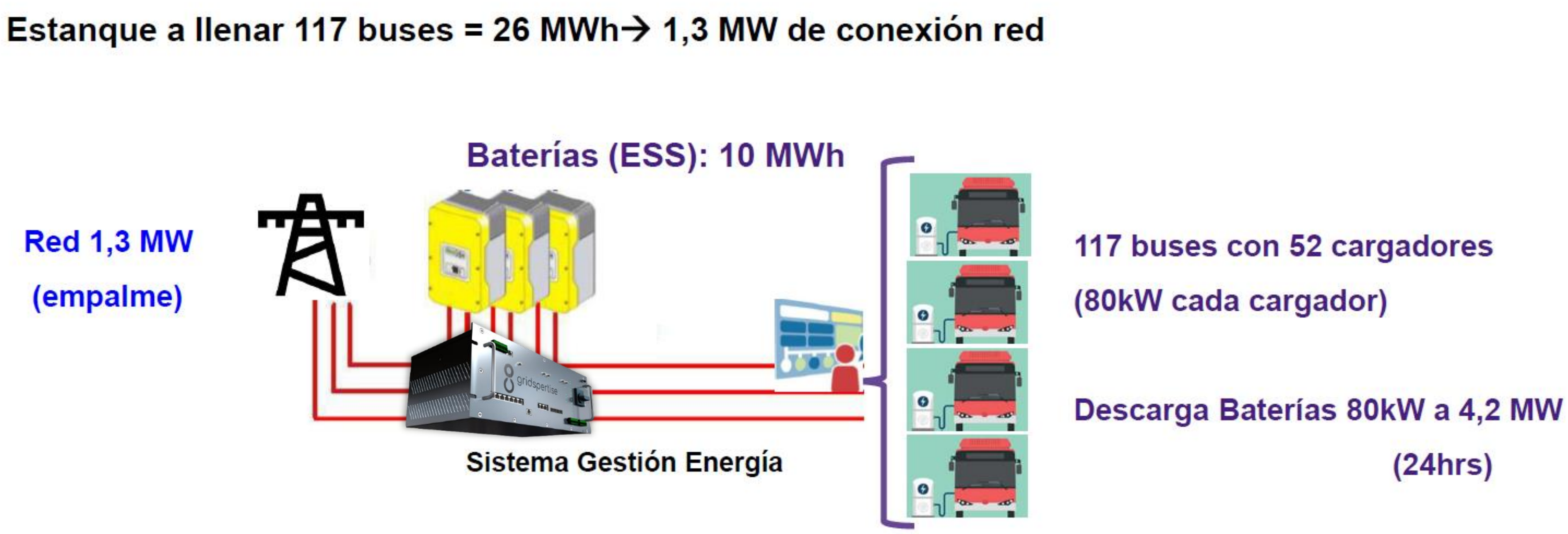
Distributed energy resources management system



DISTRIBUTED ENERGY RESOURCE MANAGEMENT SYSTEM (DERMS)

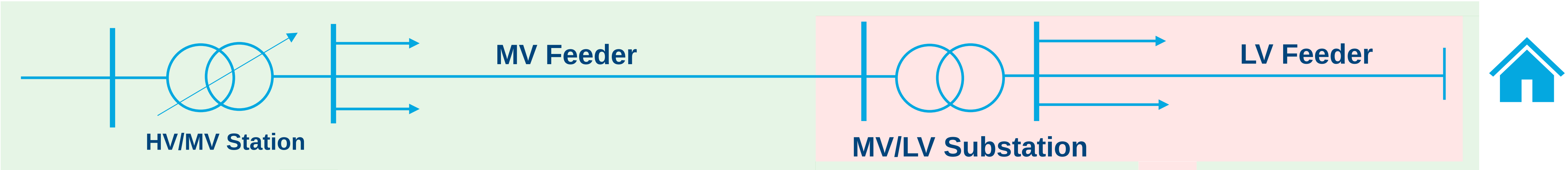


QEd energy storage applications



QEd versions

QEd versions



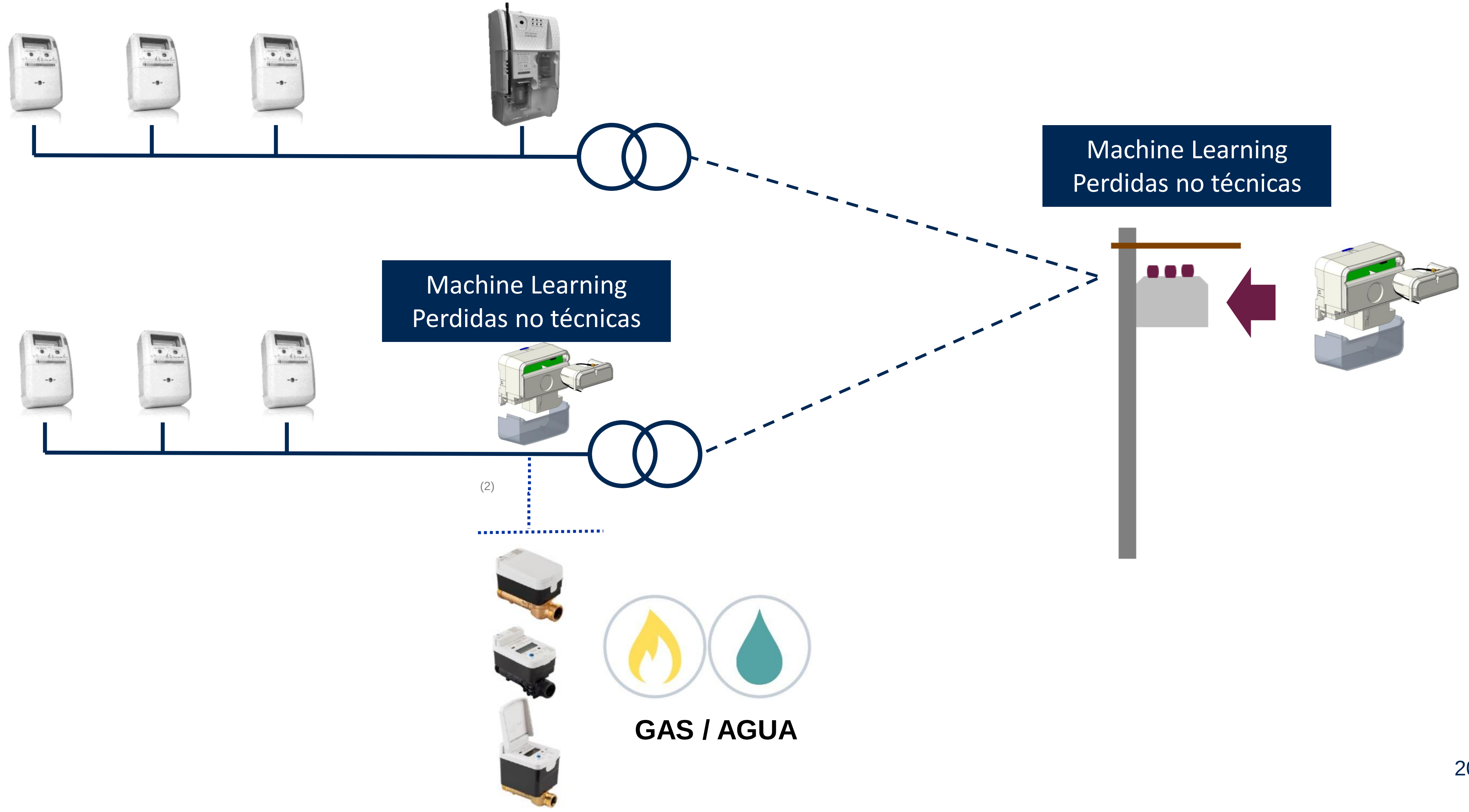
QEd

- ✓ Use cases addressable for HV, MV and LV network
- ✓ Rack 19” mounting
- ✓ AC or DC power supply
- ✓ Two versions (external or virtualized router)
- ✓ Accessories available (RIO, external power supply)

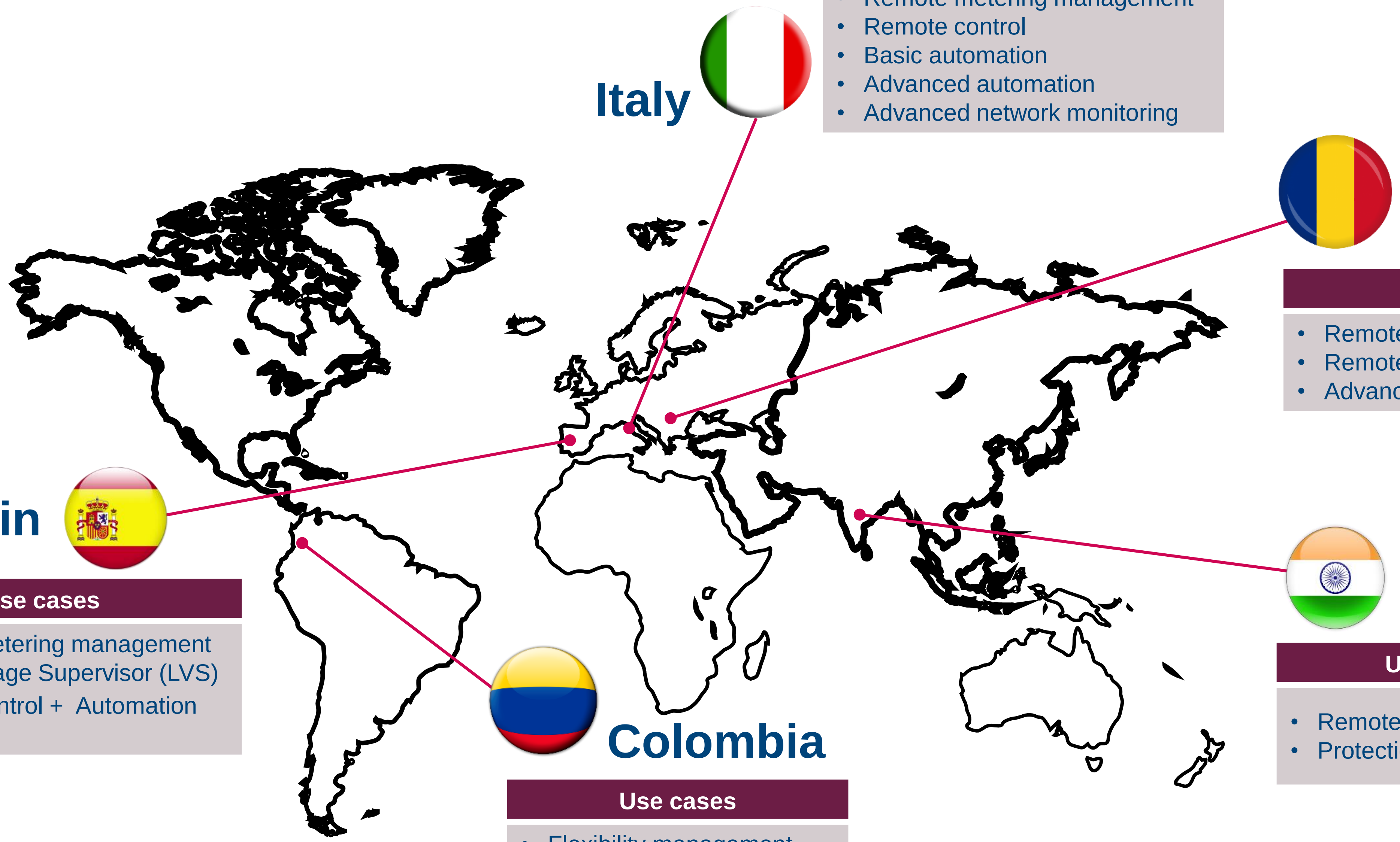
Nano QEd

- ✓ Specific for LV network
- ✓ DIN rail mounting (or three screws)
- ✓ AC or DC power supply
- ✓ Two versions
- ✓ Accessories available (RIO, power supply)

QEd in AMI / Multi-utility / Non-technical looses



DSOs ongoing projects



Italy

Use cases

- Remote metering management
- Remote control
- Basic automation
- Advanced automation
- Advanced network monitoring

Romania

Use cases

- Remote metering management
- Remote control
- Advanced automation

Spain

Use cases

- Remote metering management + Low Voltage Supervisor (LVS)
- Remote control + Automation (LARS)

Colombia

Use cases

- Flexibility management
- Remote control
- Recloser control

India

Use cases

- Remote control
- Protection and automation

… con varios casos de uso ya identificados

- Medición y monitorización básica del transformador
- Medición y supervisión avanzada de la red
- Medición de micro sincrofasores
- Medición de la calidad de la energía

- Control remoto de la red de distribución de MT/BT
- Automatización de la red de distribución de MT/BT
- Regulación Volt-VAR

- Supervisión de los DER
- DERMS para la subestación secundaria
- Control de los DER
- Control de sistemas de almacenamiento / baterías

- Detección de descargas parciales
- Detección descentralizada de condiciones críticas en la red de MT y BT
- Comunicación con localizadores de falta LoRaWAN

- Apoyo a la seguridad de los trabajadores en campo (in situ)
- Plataforma de datos en el borde con acceso multiusuario
- Economía de las API

- Detección de intrusiones físicas
- Validación de los datos de los contadores distribuidos en los límites de la red
- Detección de perdidas no técnicas

gridspertise
accelerating your electric future

Ready for a new era of smart grids?

Contact us

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