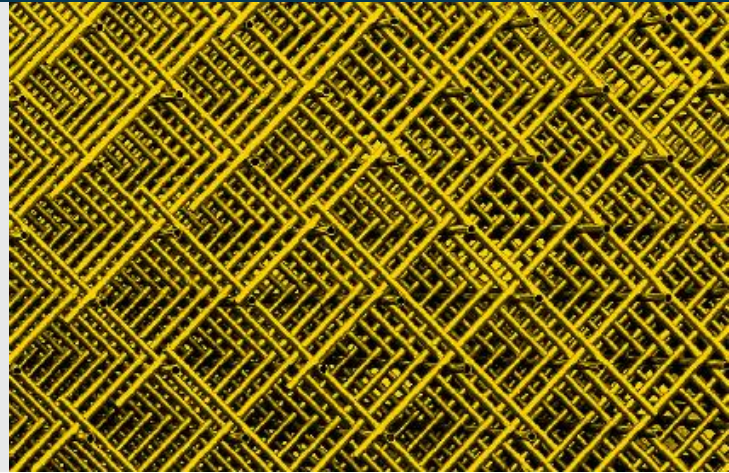


SUCCESS CASE 10.2024

GRIDWISE

THE CASE OF THE
INTELLIGENT PLATFORM THAT
MONITORS AND CONTROLS
THE LOW VOLTAGE NETWORK



THE CHALLENGE

The energy transition is increasingly evident in today's world, characterised by a decentralised approach that is reshaping how electricity is produced and consumed. New technologies for production, consumption, storage, metering, and efficient demand management are proliferating. This shift has resulted in a significant increase in bidirectional electricity and data traffic, making the low voltage (LV) network busier than ever before.

As distributed energy resources (DERs) are integrated into the grid, the complexity of managing the LV network escalates. Currently, in Portugal, this extensive network spans approximately 150,000 kilometres and serves over six million customers. The critical nature of this infrastructure necessitates enhanced visibility and control mechanisms akin to those already established in medium and high-voltage networks. Historically, LV grids have operated with limited digitalisation. However, this is rapidly changing to address key areas for improvement:

- **Impact of DERs:** As more DERs connect to the grid, their influence on voltage stability and power quality must be carefully managed.
- **Operational Efficiency:** Streamlining logistics and operations is essential for reducing costs and improving service delivery.
- **Automation and Analytics:** Increasing automation and analytical capabilities will enable proactive management of the network.

THE SOLUTION

In light of these challenges, E-REDES has embarked on a transformative journey towards digitalisation in LV management through the innovative [GridWise project](#). Launched in 2023, GridWise stands out as a pioneering solution among European DSOs. This intelligent platform integrates Information Technology (IT) and Operational Technology (OT) to effectively monitor



E-REDES transformer substations. GridWise employs advanced technologies such as artificial intelligence (AI), Internet of Things (IoT), Big Data analytics, and Edge Computing to create a centralised real-time monitoring system. The primary objectives of GridWise include:

- **Fault Detection.** The continuous monitoring of LV circuits allows for the timely identification of faults or conditions that may jeopardise the power supply.
- **Power Quality Assurance.** Monitoring power quality parameters enables the generation of compliance reports aligned with international standards.
- **Network Topology Mapping.** The automatic mapping and creation of network topology facilitate the identification of phases and outputs for each smart meter connected to transformer stations.
- **Technical Loss Analysis.** Calculating technical losses within the network provides actionable insights for planning and investment decisions.
- **Fraud Mitigation.** Enhanced capabilities for identifying non-technical losses such as theft or fraud bolster the overall network integrity.
- **Neutral Conductor Monitoring.** Tracking the physical loss of neutral conductors ensures comprehensive oversight of network performance.



THE RESULTS

The implementation of GridWise yielded remarkable improvements in both efficiency and service quality for E-REDES:

- **Cost Savings.** Regulatory power quality monitoring costs have been reduced by approximately €1.5k per year for each transformer substation installed. With 168 transformers planned for installation in 2024, this translates to an estimated total savings of €250k annually.
- **Faster Fault Resolution.** The average time required to detect, allocate resources, and resolve faults has decreased by around 20 minutes compared to traditional methods reliant on call centre communications.
- **Fraud Detection Potential.** The enhanced monitoring capabilities of GridWise improve the potential for detecting and mitigating fraud and theft within the network.
- **Improved Quality Indicators:** The positive impact on Technical Service Quality indicators reflects a commitment to reducing fault identification times and improving operational responsiveness.



OTHER BENEFITS

- **Social Benefits.** Minimising the negative impact of network disturbances on the daily activities of individuals and businesses is crucial. By ensuring a stable power supply, GridWise enhances the reliability of services that people rely on for their everyday activities.
- **Environmental Benefits.** The GridWise project not only enhances operational efficiency but also contributes to sustainability goals. By optimising energy consumption and reducing losses, GridWise plays a vital role in decreasing carbon emissions associated with electricity distribution.

AWARDS

The innovative approach embodied by GridWise has attracted significant recognition within the industry:

- **Portugal Digital Awards 2023.** GridWise was awarded in categories such as *Best Future of Intelligence Project* and *Best Energy & Utilities Project*.
- **KAIZEN Awards Portugal 2024.** GridWise was recognised in the *Innovation* category for its transformative impact on energy management.

NEXT STEPS

The GridWise project is advancing on two crucial fronts. In the short term, all analytical layers will be integrated into corporate systems while, in the medium term, these will be connected with Advanced Distribution Management Systems (ADMS). The number of monitored transformer substations is set to expand significantly, from 200 at the end of 2023 to approximately 12'000 by the end of the decade.

