

Laborelec

RESEARCH & INNOVATION



KEEPING YOUR ELECTRICAL NETWORK HIGHLY RELIABLE

Avoiding issues with your electrical installations

Electrical power networks at industrial plants are becoming more complex and vulnerable, due to the increasing number of power electronics devices used in the network and because distributed renewable energy production is being integrated. In addition to malfunctions of various types, the potential consequences include unplanned process interruptions and reduced lifetime of assets. These may be caused by suboptimal design:

- Below-standard power quality or disturbances in the power supply.
- Electromagnetic compatibility (EMC) issues.
- An insufficiently robust power protection system.

ENGIE Laborelec provides expert services to address all these potential issues, preventing significant profit loss.



ENGIE LABORELEC ELECTRICAL NETWORK SERVICES IN A NUTSHELL

NETWORK COMPLIANCE SERVICES

- Grid code compliance assessment
- Remote Monitoring of the power quality of networks
- Electromagnetic compatibility (EMC) and EMF measurements

NETWORK RELIABILITY ASSESSMENT

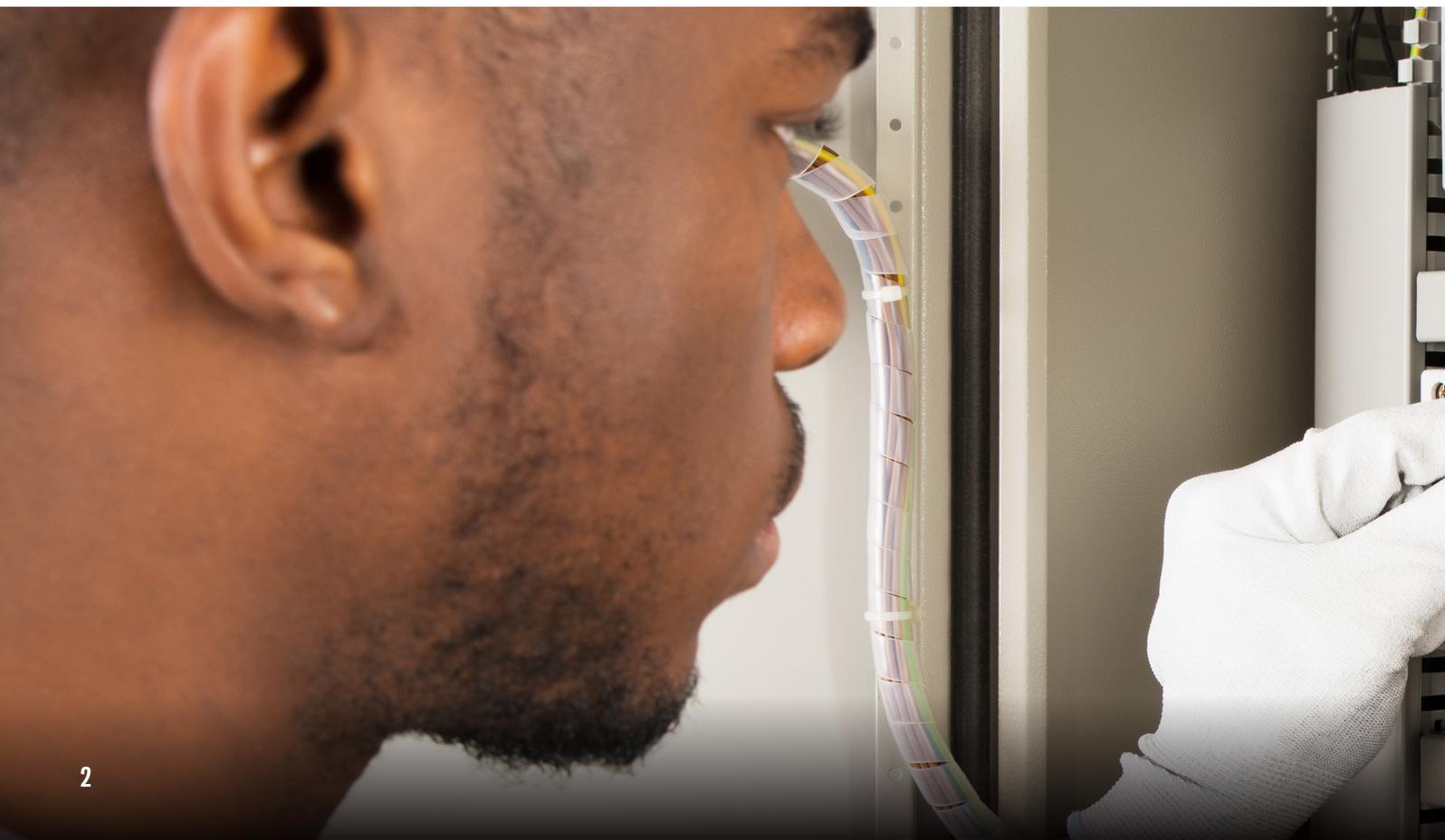
- Design check of network reliability (stability, quality, safety)
- Protection selectivity and redundancy study of the power system
- On-site testing of the protection system

ADVICE RELATED TO PROCESS MODIFICATIONS

- On-site measurements
- Simulations, design, dimensioning
- Advice on protection and power quality
- Post-integration check

FAILURE INVESTIGATION AND MITIGATION

- On-site investigation and measurements
- Root Cause Analysis (RCA) of failures and issues
- Troubleshooting and development of a comprehensive solution



NETWORK COMPLIANCE SERVICES

Each industrial installation must comply with standards and regulatory requirements.

Compliance is required to avoid:

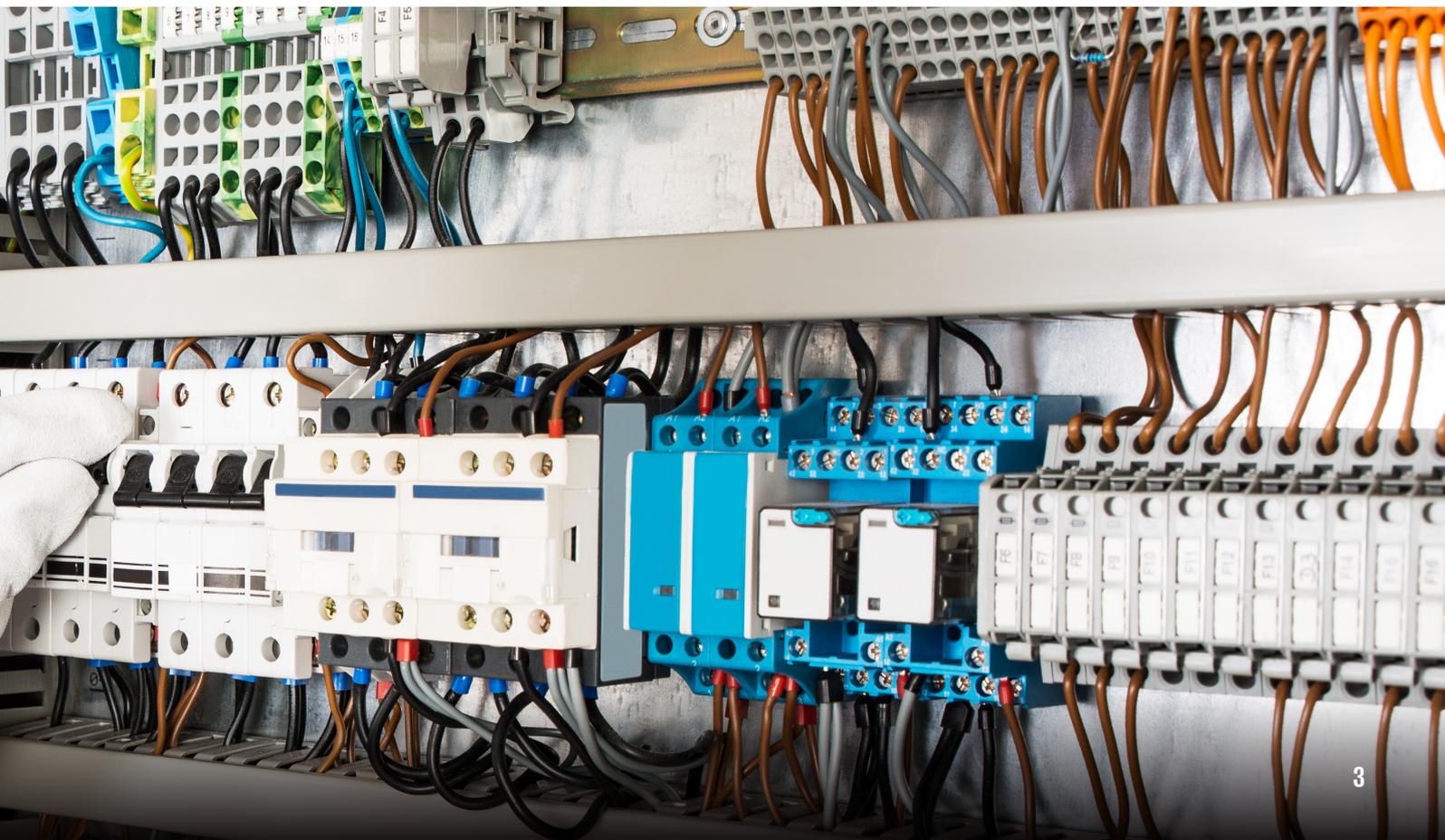
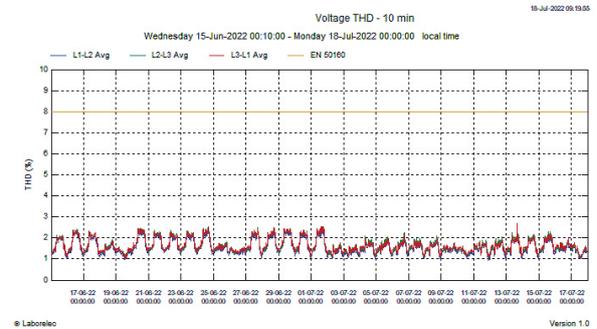
- having to pay penalties to the system operator,
- unplanned interruption of processes, malfunctions, and reduced lifetime of assets.

ENGIE Laborelec checks if your installation complies with applicable grid code standards and regulatory requirements:

- We perform grid codes compliance assessments.
- We perform power quality compliance measures of your electrical network using certified power quality meters. We can verify compliance with EN 50160 or any other standard, either carrying out a short-period compliance check (of minimum one week) or performing continuous compliance measures for longer periods.

- We also carry out electromagnetic fields measurements to verify compliance with the EMC 2014/30/EU health directive or other standards.
- In addition, we perform measurements of ambient electromagnetic fields using EMF meters.

ENGIE Laborelec is since many years the Belgian reference in continuous power quality monitoring and compliance for industrial and system operators.



NETWORK RELIABILITY ASSESSMENT



It is extremely important for your crucial applications that your power supply is always fully reliable, and that backup supply is available in the event of an unexpected outage. Redundancy and reliability of supply are especially critical for applications that may not be interrupted.

ENGIE Laborelec analyzes your supply's design. We verify whether sufficient redundancies are present and check the operational readiness and health of emergency supplies such as diesel generators and UPSs. The analysis may also include verifying details such as the coherence of the neutral point earthing regime between different sources, which can cause a major failure if not designed coherently.

We describe our findings in a comprehensive report and make recommendations for improving the design wherever needed.



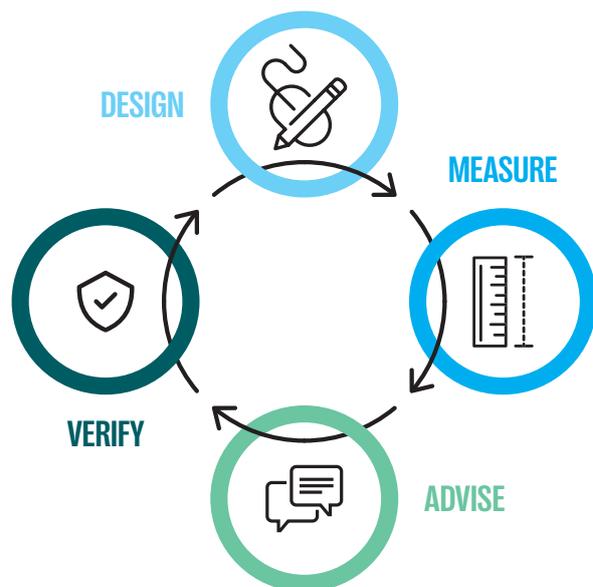
ADVICE RELATED TO PROCESS MODIFICATIONS

Process modifications can involve additional loads to be connected, new circuits to be wired, and internal (classic or renewable) power production with self-consumption and battery storage to be implemented. However, the updated installation should be at least as reliable as before the changes to avoid any technical and economic losses.

We provide the following services to assist industrial operators in keeping their electrical installation stable, safe, and reliable:

- 1. DESIGN** – We make calculations (related to harmonics, protections, statics and dynamics) and design solutions to mitigate issues and optimize the installation's performance.
- 2. MEASURE** – We perform on-site measurements before the integration of the new loads or generators.
- 3. ADVISE** – We give advice on how to better protect the installation. On request, we set it up on site. We also carry out several types of numerical simulations (for example of converter-based generation and loads) which allow us to give tailored advice on how to ensure high power quality.
- 4. VERIFY** – We perform post-integration checks with on-site inspections and measurements, for example at start-up of a new load or in transient situations to verify if it works as expected and does not jeopardize the system's stability and safety.

ENGIE Laborelec has many years of experience with this, for example with industrial sites integrating local (renewable or thermal) power generation and replacing or adding motors and compensation devices.



FAILURE INVESTIGATION AND MITIGATION (ROOT CAUSE ANALYSIS)

Equipment failure might happen in any kind of electrical installation. It is critical to learn from past experiences to ensure that quality remains high and services to clients remain reliable. ENGIE Laborelec is the undisputed expert in troubleshooting incidents and failures in electrical installations and developing mitigating solutions. Using a large array of measurement devices and high-frequency oscilloscopes, we perform troubleshooting missions on any type of installation in a wide voltage and power range.

- We carry out on-site investigations and visual inspections, evaluate the SLDs (Single Line Diagram), and perform tests.
- We perform measurements on the installation in operation to reproduce the observed behavior and assess the origin of the issues.
- We carry out root cause analyses (RCA) for any type of equipment, including protections, MV and HV substation equipment, and power electronics.
- We troubleshoot and develop a comprehensive solution in close collaboration with the industrial operator.

Failure investigations and troubleshooting missions are a daily business for ENGIE Laborelec. We perform such missions every week at industrial sites, for network operators or at power plants. Typical missions include measuring electrical quantities at a motor start-up to give recommendations on how to avoid issues such as voltage dips or vibrations on neighboring equipment. We also scrutinize more complex issues involving in-depth investigations of protection and control systems such as IGBTs on a converter.



ABOUT THE ENGIE LABORELEC POWER NETWORKS TEAM

- Our power networks team consists of more than 10 experts in power electronics, EMC, and power protection.
- We have a vast array of special measurement systems at our disposal, including power quality meters, high-sampling-rate oscilloscopes, protection test equipment, and EMF meters.
- We use state-of-the-art simulation software such as Comsol, Matlab, EMTP, Neplan and Power factory.
- With our power quality compliance measurements, network reliability assessments, failure investigations and troubleshooting missions, and assistance related to process modifications, we have been helping a large number of industrial operators for many years, mainly in the Benelux.

FIVE REASONS TO CHOOSE ENGIE LABORELEC

- Wide range of technical competencies in Electricity Generation, Grids, and End-Use
- Increased profitability and sustainability of your energy processes and assets
- Unique combination of contract research and operational assistance
- Independent advice based on certified laboratory and field analyses all over the world
- More than 60 years of experience

**DO YOU WANT TO
KEEP YOUR ELECTRICAL
NETWORK HIGHLY RELIABLE?**

Send us an e-mail at industry.laborelec@engie.com and we'll contact you to see what we can do for you.

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