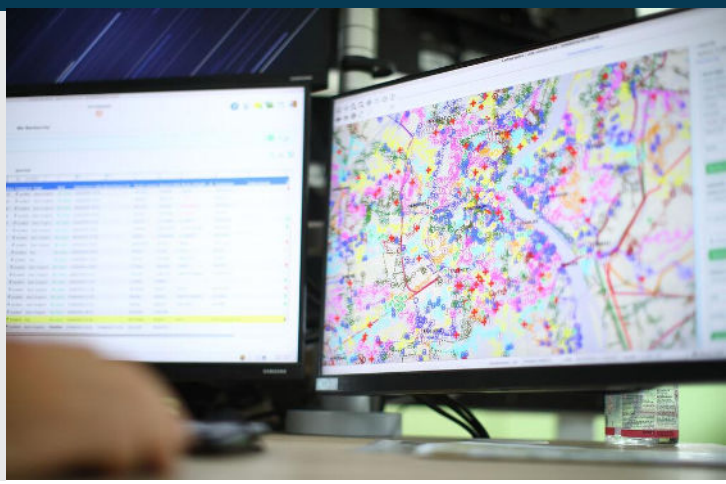
SUCCESS CASE 20.2025

Cartoline

ARTIFICIAL INTELLIGENCE AND SMART GRIDS FOR PREDICTIVE MAINTENANCE OF THE LOW VOLTAGE NETWORK



THE CHALLENGE

Enedis manages the electricity distribution network for most of the French metropolitan area, for businesses, professionals and individuals. For many years, maintenance activities have been managed with traditional organisations and were based to a significant extent on repair work triggered by customer calls following power outages. Now, smart meters and enriched data can enable significant improvements.

Enedis Smart Grid management began in 2012 with the deployment of new equipment, linked to the advanced metering infrastructure. The first improvements soon followed, with the implementation of standard services such as system alarms and network monitoring. From 2018, the company was able to implement experiments and high-value added services thanks to the large amount of collected data that could be analysed, such as improved network mapping or prediction network needs. The challenge was then to shift network maintenance from classic incident workflow to predictive maintenance executed before any customer call.

THE SOLUTION

Network meters provide data that can detect equipment failure before it happens: voltage spikes, high or low voltage swings and power cuts. With millions of sensors deployed, it is possible to process a large amount of data and develop a machine learning model that detects potential outages and recommends interventions. Operations teams can then proactively plan their interventions, reducing operational risk and increasing customer satisfaction.

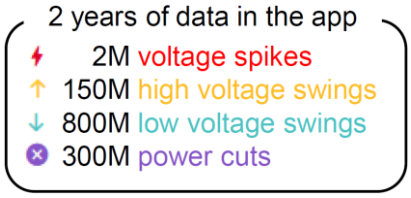
Cartoline

MAIN ACHIEVEMENTS

With Cartoline, Enedis offers an artificial intelligence (AI)-based application to visualise

hardware failures in medium and low voltage networks and to plan maintenance operations. Enedis' intellectual property is protected by a granted European patent.

Operations managers use Cartoline to pinpoint network failures before they occur. Every report is a collection of events. The recommendation model prioritises reports that need urgent attention. The application prompts the operations manager to provide feedback on each case to improve the relevance of the model. After two years of use, more than 3'000 cases have been addressed with the support of Cartoline.



Volumes of data used by the PRODIGE algorithms.

KEY SUCCESS FACTORS

There are two key factors that ensure the success of this type of application:

- The identification of hardware failures and the recommendation of interventions are based on a machine learning model. The more data there is in the training dataset, the more accurate the model will be.
- Implementing predictive maintenance is a major change in organisations, as operations teams no longer intervene reactively on incidents. It is important to consider the necessary management change to ensure that the application comes at the right time in the organisation's workflow.

WAY FORWARD

For now, Cartoline identifies hardware failures based on general voltage variations. Other use cases could be implemented, either to get more detailed diagnostics with the recommended actions or to trigger other types of failures.

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