

SUCCESS CASE 7.2024

DORA

MAINTENANCE OF OVERHEAD 20 KV NETWORKS WITH DRONES AND ARTIFICIAL INTELLIGENCE



THE CHALLENGE

With 310'000 km of 20 kV overhead lines, i.e. 47% of the medium-voltage (MV) network, the maintenance of overhead networks is a major challenge for Enedis, especially as a large number of these lines are destined to remain in place, in particular non-looped antennas serving few customers.

This is why in 2021 Enedis launched an ambitious program to reinforce and bring up to the latest construction standards 8'000 km of 20 kV overhead networks every year. Part of this program aims to select the 8'000 km to be renovated as intelligently as possible. This selection calls on Big Data processing based on information from Enedis' Geographic Information System (GIS), as well as incident history and ageing information for certain structures. After this selection, the lines to be upgraded are inspected by drones to list the anomalies found on the network and assess the cost of the maintenance work. This is the purpose of the DORA program.

THE SOLUTION

DORA is a platform that collects photos of 20 kV poles taken by drones, classifies these photos by pole and then analyses these photos using artificial intelligence (AI) to search for anomalies and speed up the selection process and the replacement decision.

There are several types of anomalies:

- Broken, deformed or rusted elements.
- Obsolete or fragile components.
- Weak points on the 20 kV network which are likely to produce an incident in the medium or long term.



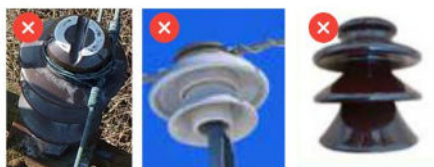
MAIN ACHIEVEMENTS

DORA is now operational and deployed in all 25 Enedis regional divisions. The platform is used every day by 250 employees who carry out diagnostics and costings to decide whether to renovate the lines or bury them if the overhead renovation is too costly.

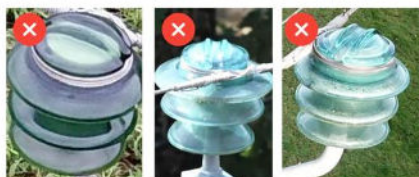
The AI model was trained on a dataset of 30'000 labelled photos to identify almost all possible anomalies on Enedis' overhead MV networks. Prior to this operation, a working group consisting of experts from the field and the technical department of Enedis drew up a set of guidelines that support all DORA users in applying the same rules for replacing or preserving elements, depending on their characteristics. This repository was used to build the AI training dataset which presents photos of objects to be retained or replaced.

Isolateur / Rigide

Technologie obsolète



Isolateur céramique



VHT 30/32/36

Technologie à maintenir



VHT 20/22

VHT 20/22 à croix

Extract from DORA's technical specifications.

KEY SUCCESS FACTORS

The first success factor is the harmonization of renewal practices. This operation took 18 months to bring together national experts and field technicians. Before this, each technician chose whether to replace a component or not based on their own experience. **The quality of the AI training dataset is another key element.** This requires a large number of photos of the same broken or obsolete elements to guarantee sufficient performance in detecting anomalies. Without this, operators would make too many corrections to the AI's proposals and lose confidence in DORA. Finally, **the DORA tool must remain easy to use, and ergonomic and offer regular upgrades based on feedback from users in the field.**