

The Red Eléctrica Group develops 4 innovation pilot projects to analyse the potential of 5G in the management of electricity grid infrastructure

- Led by REE, Elewit and Hispasat, the four use cases test the capacity of 5G to optimise the management and remote visual inspection of high-voltage electricity facilities such as substations and electricity lines.
- All the projects are in the incubation phase and are part of a 5G macro-project promoted through a joint venture between 8 leading companies in technological innovation and telecommunications.

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The Red Eléctrica Group -through its subsidiary companies Red Eléctrica de España, Elewit and Hispasat- is conducting four pilot projects that analyse the potential of 5G technology in the management and maintenance of electricity grid infrastructure. These initiatives are part of a macro-project consisting of 15 use cases that are being carried out in the Region of Valencia. Said projects are being promoted and driven by a joint venture between Elewit, Orange, Aracnocóptero, CFZ Cobots, Etra, Idrica, Robotnik and Visyon and their goal is to research how this new technological standard can be applied to the electricity grid system.

For Silvia Bruno, director of Elewit and chairwoman of the joint venture, "5G opens up a range of new possibilities for the industrial structure by allowing numerous fields of application where it is required to maintain critical communications in real time with very high reliability and, therefore, it will significantly boost the digital transformation of companies."

The four pilot projects launched by Red Eléctrica de España, Elewit and Hispasat, in collaboration with other partners, test the use of 5G in the management and remote visual inspection of high-voltage transmission grid infrastructure such as substations and power lines. Specifically, in the Region of Valencia, the Group is assessing the capacity of 5G and its characteristics - such as high-speed data transmission, low latency and a large number of connected devices - in order to optimise asset maintenance processes, strengthen the safety of facilities and of those professionals who perform work on the Company's grid infrastructure and improve response time in the case of any eventuality.

5G - optimizing the management and inspection of facilities

Two of the use cases combine the use of machine vision systems (such as cameras) or remotely operated systems (such as robots or drones) with this new communication standard. Another pilot project tests satellite connectivity as a back-up to the terrestrial 5G network to ensure that infrastructure assets always have high performance network connectivity. Lastly, the fourth pilot project analyses 5G as a connectivity alternative for the grid system's protection equipment.

For Ms. Bruno, "all these use cases, which are in the incubation phase, show that in the Red Eléctrica Group we are ahead of technological trends in order to make the most of their capabilities and make them available for the activities we carry out. To do this, we are committed to technological innovation, and we surround ourselves with extraordinary talent."



- **Inspection of substations and electricity lines with robots and drones.** Red Eléctrica de España, Elewit, Aracnocóptero and Orange are participating in this project. Its objective is to analyse the use of robots and drones equipped with connectivity through 5G broadband for the inspection of electricity facilities (substations and lines). Specifically, thanks to 5G, the remotely piloted aircraft used are continuously monitored and transmit the data obtained during the inspection in real time. Thus, the aim of the pilot is to demonstrate that this new technological communications standard enables the sending of information obtained via robots and drones in a fast, optimised, and structured manner, and therefore reduces the response time to possible eventualities. This would contribute to strengthening the safety of facilities and improving inspection and analysis processes.
- **5G redundancy via satellite.** Red Eléctrica de España, Hispasat, Elewit, Aracnocóptero and Orange are collaborating on this project. It is being carried out in the first section of the Morvedre-Eliana line, in the Region of Valencia. This pilot project incorporates communications by means of geostationary satellites as a redundant transmission method. Specifically, the satellites function as a backup for the terrestrial network for 5G, ensuring high-performance connectivity at any geographical point and in any scenario. Sending data simultaneously over both routes (terrestrial network and satellites) increases the availability of information at all times and its analysis in real time during electricity line inspections, which can be carried out over long distances and even on the move, on board a vehicle.
- **Remote visual inspection / installing sensors on SF₆ Gas-insulated equipment in substations.** Red Eléctrica de España, Elewit and Orange are exploring the potential of 5G to facilitate the remote visual inspection of electricity facilities and the detection of possible anomalies. Specifically, in the Morvedre substation, near Sagunto (Valencia), a network of sensors and machine vision systems (fixed and mobile cameras) has been installed to inspect the infrastructure from any point of the substation. A monitoring system has also been installed to improve efficiency in the detection of SO₂ or SF₆ -insulating gases whose leakage can be an indicator of possible failure-. The high bandwidth and low latency of 5G facilitates the transmission of high-quality images in real time and the use of remotely operated cameras, which could contribute to bolstering the safety of assets and of those professionals who perform work on the Company's grid infrastructure, and moreover boost the development of new predictive maintenance tools.
- **Digital twin and wide area protection.** This use case involves Red Eléctrica de España, Elewit and Orange. The electricity grid protection and control systems installed in substations have very demanding and strict communication requirements (need for high-precision time synchronisation, low latency, high availability, cybersecurity). This pilot analyses 5G as an alternative or additional connectivity option for this protection equipment and opens the door to its use in order to communicate with third-party installations that do not have access to the transmission grid's fibre optic network. In this way, communication between equipment via 5G would facilitate the independence of these systems from any means of communication and their possible delocalisation (digital twin).

5G projects

The 15 tests being implemented in the Region of Valencia for the future application of 5G are part of the National 5G Plan, Spain's programme for the development of 5G technology pilot projects carried out by the public business entity Red.es, promoted by the Ministry of Economic Affairs and Digital Transformation and co-financed by the European Regional Development Fund. This Plan aims to stimulate the definition and implementation of multiple



use cases of this technology through the building of an ecosystem of technological partners, who will join forces in order to accelerate the process to make the so-called digital economy a reality in the near future.