

SUCCESS STORY

Smart medium-voltage solution with Relion® protection relays

ACEA smart grid, Rome, Italy



Improved power distribution system reliability through advanced automation and logic selectivity using the IEC 61850 standard to ensure continuous power in the city of Rome.

Project at a glance

Customer: Areti SpA

Segment: Utility

ABB products: Relion® REC615 protection relay, UniSec HBC switchgear, HySec apparatus, current and voltage sensors, Remote I/O unit RIO600

Customer challenge

Drastic reduction of number and duration of outages and then improvement of service continuity in medium-voltage secondary distribution.

The customer acknowledged the need to ensure continuity of electricity distribution, reduce energy losses and improve the overall load capacity in the grid, as the amount of distributed generation increases.

To meet these challenges, the customer identified the need for investments into their medium-voltage grid to improve data acquisition and gain seamless communication between substations, and from substations to the control center.

ABB solution

ABB offered a solution with a new type of secondary substation recloser, which is based on UniSec switchgear, equipped with multi-function HySec apparatus, which integrates a circuit breaker and a disconnecter in the same device, making it an

exceptionally compact solution. The advanced REC615 protection relay is used for control, monitoring and protection of the cable feeders and offers superior fault detection and location, using IEC 61850 and IEC 60870-5-101/104 protocols.

To improve reliability and to reduce the duration and frequency of power outages, ABB's solution is built on logic selectivity between the protection relays, as this is an effective approach to reduce the area affected by a fault.

Further, to improve selectivity in the grid – and thus ensure continuity of the electricity distribution and reduce energy losses – high accuracy current and voltage sensors provide the relays with very precise measurements.

In ABB's solution, the reclosers can operate at three different automation levels. To activate the applicable automation level for a certain part of the medium-voltage grid, the operator simply selects another configuration option in the REC615 software.

To ensure power system reliability and performance, the solution relies on horizontal GOOSE-based communication technology. GOOSE (Generic Object Oriented Substation Events) is part of the IEC 61850 standard for power system automation.

Customer benefits

- Flexibility to apply different levels of automation for different areas in the smart grid
- Cost savings as there were no replacements needed for the legacy devices in the primary substation, via utilizing the remote I/O RIO600 device
- Improved reliability and significant reduction in both the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI)
- The HBC circuit breaker panel, which is only 500 mm wide and includes all protection, communication and automation equipment, was an ideal fit for the limited space available in the existing substations.



About the project

The ACEA smart grid project aims to deploy new technological solutions. In this project, two primary substations and 76 secondary substations are upgraded and a total of 70 km of new medium-voltage lines are drawn to distribute electricity to about 1200 households and 7 industrial plants in the region of Malagrotta-Ponte Galeria in Rome, Italy. The medium-voltage lines are connected to four distributed generation plants (one photovoltaic and three gas turbine plants).

The logic selectivity developed for the project is based on the IEC 61850 protocol. The communication between the intelligent devices and substations up to the supervisory control and data acquisition (SCADA) system is over a wireless network.

As a result of the successful implementation of this solution, Areti chose to deploy the same solution for their entire secondary distribution network.

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