

# SIEMENS

*Ingenuity for life*

## Smart grid expansion in Cologne-Chorweiler

Rheinische NETZGesellschaft mbH

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### Distributed intelligence ensures a reliable power supply

The distribution grid in the Chorweiler district of Cologne has grown over the years and is therefore highly mesh-operated. As a result, there is also a great need to invest in this system. To reduce equipment stock while maintaining a reliable power supply, Rheinische NETZGesellschaft (RNG), in its capacity as the grid operator of RheinEnergie AG, is installing intelligent, autonomous secondary substations. These substations will supply power in an open ring configuration.

In keeping with its commitment to innovation, RNG is setting new standards in the Chorweiler distribution grid and is building a distributed self-healing function that will use automation and communication technology to significantly reduce downtimes. If a fault occurs, only the section where the incident arose is separated from the medium-voltage grid and not the entire ring. Intact areas of the grid are automatically resupplied from the other side of the ring. This functionality makes it possible to shorten downtimes from hours to mere seconds.

In this configuration, the control center is notified of malfunctions, but does not control the individual stations. The SIPROTEC 7SC80 feeder automation controller operates fully independently.

*“Installing the distributed self-healing function will continue to ensure a secure power supply for Cologne in the future.”*

Dr. Andreas Cerbe, CTO of RheinEnergie, Cologne



**RNG** Rheinische  
NETZGesellschaft



### Challenges for the customer

An aging, highly mesh-operated distribution grid that will require a great deal of investment in the future makes it necessary to search for an innovative and alternative modernization concept:

- Design of a cost-effective alternative to conventional modernization
- Guarantee of high supply reliability

### Customer objectives

An uninterruptible power supply is RNG's top priority. A total of 16 secondary substations are to be supplied from the Chorweiler transformer substations via two circuit-breaker panels in an open ring structure.

- Lower investment expenditures in the future
- Streamlining of evolved grid structures without sacrificing supply quality
- Fewer downtimes and disruptions in the event of a malfunction
- Testing of new concepts and solutions for distribution grid automation, such as:
  - Function testing during operation
  - Ability to be integrated into existing operating processes
  - Distributed, autonomous solution without manual intervention into grid management
- Standardization of a scalable solution for further use in comparable situations

### Our solution

Three selected load-center substations were equipped with the SIPROTEC 7SC80 feeder automation controllers. In the event of an outage, these controllers safeguard the supply by exchanging data directly via GOOSE messages based on the IEC 61850 protocol. The communication network between the distribution grid stations and the transformer substation, which had already been shut down, was upgraded with modern communication infrastructure.

A SIPROTEC 7SC80, which combines the measurement, control, and automation functions in one unit, was installed for each panel in three secondary substations. A key component of the devices is the distributed analysis and decision-making function with no manual intervention into the grid management. The devices use peer-to-peer communication as well as the upgraded communication infrastructure. The data exchange facilitates fast, unambiguous fault localization and the reconfiguration of the faulty grid. The control center is also connected via a central information interface.

### Customer benefits

Thanks to the distributed grid automation system, the distribution grid can be operated very cost-efficiently.

The distributed fault localization and robust communication solution between the secondary substations and the primary substation lessen the control center's workload. The time and effort required for clearing faults is reduced, and the fault clearance team can be used efficiently. The solution also minimizes downtimes.

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