

SUCCESS STORY

UniGear Digital to Kalasatama smart city district Helsinki, Finland



A reliable and energy-efficient power distribution solution based on UniGear Digital switchgear to safeguard the distribution of power and ensure uptime in Kalasatama - the smart urban development district in the Finnish capital.

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01 The Kalasatama district is a grand-scale innovation platform for smart city and urban development

Project at a glance

- Customer: Helen Electricity Network Ltd.
- Segment: Utility
- ABB products: UniGear ZS1 Digital switchgear, Relion® 615 series protection relays, vacuum circuit breaker VD4, indoor current sensor KECA, indoor voltage sensor KEVA, Remote Terminal Unit RTU560

Customer challenges

In a smart city, the importance of electricity is amplified and constantly increasing, and even short power cuts are more damaging. For the local utility, Helen, the new district brings about the need to introduce smart and reliability-improving solutions for electricity distribution.

In city networks it is crucial that faults are located quickly and accurately to avoid costly power outages. The network topology chosen for the center of Kalasatama is a closed ring network, which is an unconventional approach for a Finnish utility, where the most commonly used topology is open ring network.

The customer was looking for an optimized total cost of ownership (TCO), taking into account also the costs of operation, and to reduce the amount of spare parts.

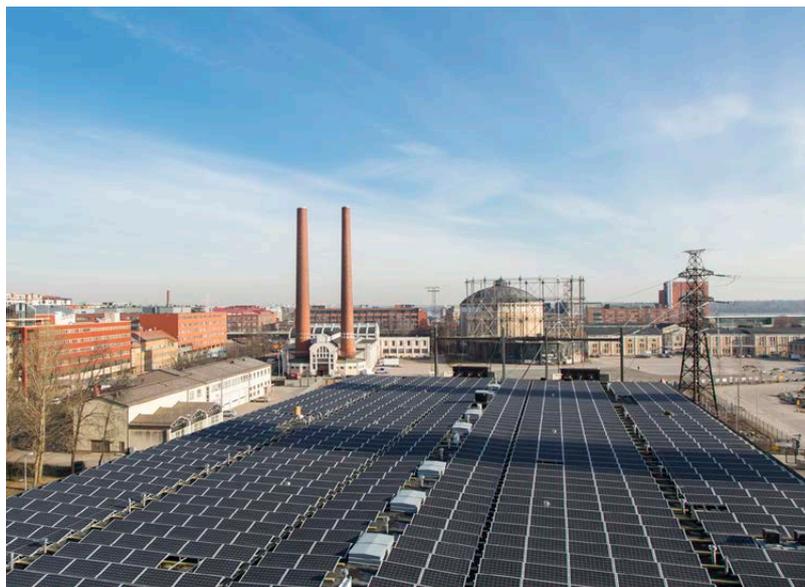
ABB solution

ABB's UniGear Digital was implemented to meet the high demands for the network, as it offers a smart solution with more complex protection schemes to safeguard the power distribution in the area.

Helen's own research for ring network topology, found that implementing differential protection and earth-fault current comparison using blocking schemes would be the most suitable line protection solution. These advanced protection schemes could be implemented with the help of ABB's Relion protection relays with IEC 61850 digital communication and GOOSE (Generic Object Oriented Substation Events) messaging.

Thanks to the use of sensor technology, the continuity of service is maximized. The sensors have a broad current range, 50 kVA up to 40 MVA, and do not need to be replaced as conventional metering transformers do, if the rated current changes more than originally planned. Replacing the metering transformers would also involve powering down the equipment and possibly cause service disruptions.

With sensor technology-based solutions all application needs are covered using only a couple of current or combi sensors. This helps to minimize inventory.



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01 UniGear Digital uses well-proven components: current and voltage sensors, and protection relays with IEC 61850 digital communication

02 When the volume of solar power increases, electricity production will vary according to the weather conditions. Photo courtesy of Helen Ltd.

Customer benefits

- Fast and precise actions in case of network failures possible with the permanent active supervision feature of IEC 61850 digital communication
- Improved reliability and functionality of the power system with IEC 61850-9-2 sampled values (process bus), which is used for distribution of voltage measurements
- Accurate measurements and easy data management in the power system thanks to sensor technology
- Considerable energy savings with sensors instead of conventional metering transformers - and higher safety level for operators
- Reduced cost and minimized footprint as no separate voltage transformer measuring bays are needed
- Switchgear can be easily adapted when network requirements change

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About the project

Kalasatama is a district for piloting urban development and smart city concepts. By the time Kalasatama is completed in the 2030s, the district will have created 10,000 jobs and contain 200 football fields-worth of new housing.

Kalasatama is Finland's first model district of smart energy systems, where the latest energy, information and communications technology solutions are combined.

Helen Electricity Network Ltd. has built a new main substation in Kalasatama to strengthen electricity distribution in the area, supplying a new underground distribution network. 14 panels of UniGear Digital are installed in two secondary substations (8+6 = 14 panels) in the area.

The smart energy grid supports electric vehicle use, new energy storage facilities, and energy-efficient building automation as well as local energy production.

Helen Electricity Network Ltd. has 385,000 customers in Helsinki, and an average yearly outage time (SAIDI) of only three minutes per customer. At Kalasatama the company is both testing and implementing new technology solutions.

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