

CASE STUDY

JP Komunalno Brčko—Bosnia and Herzegovina

Distribution Automation Smart Grid Pilot Project Improves Electric Power Reliability and Lifestyles for Eastern European Community

Residents of the Brčko District in Bosnia and Herzegovina now have dependable electric power, but it has not always been this way. For years, the residents of this Eastern European community faced extended power outages and frequent power cuts. Because their distribution system was outdated, when storms came, residents would have to wait for hours for their electricity to come back on.

Lacking modern equipment, JP Komunalno Brčko, the utility serving the district, took a common-sense approach to locating distribution faults: personnel would walk or drive the length of the power lines for as long as it took to visually identify the source of the outage. The time spent on repair was often extended by the time it took to visually find the fault. This meant Brčko residents had to regularly adjust their lives to deal with unreliable electric power.

Distribution Network Automation

The situation in Brčko changed in 2015 after the nonprofit United States Energy Association (USEA) sponsored a volunteer smart grid test program. This program prompted Schweitzer Engineering Laboratories, Inc. (SEL) and JP Komunalno Brčko to work together to discover the impact modern distribution automation technology could have on the community's power system. USEA selected SEL to run the project because of SEL's demonstrated distribution automation capabilities as well as the company's accomplishments in the United States market. SEL donated

equipment and services, and the United States Agency for International Development (USAID) provided the funding.

SEL has a unique way of approaching distribution automation called DNA (Distribution Network Automation®). The SEL DNA solution is the coordinated protection, control, automation, and monitoring of distribution feeders and systems. DNA reacts quickly when a fault occurs by combining the intelligence of power system devices with secure communications. Safety and reliability are two main benefits of the SEL DNA solution. Because there is no need to upgrade existing equipment, operators can use the equipment they already have, making DNA an economical solution.

To take DNA technology to Brčko, SEL deployed a team of experts, each with an impressive background and specialization. Principal Engineer Fernando Calero, well known for his extensive experience with grounded as well as ungrounded electrical systems, provided design assistance. SEL Regional Technical Manager John Needs provided recloser control training, and Application Engineer Giorgio Vielmini helped commission the project. SEL's integrator, Saturn Electric, Inc., prepared the equipment for two Brčko distribution lines.

In order to build a turnkey DNA solution, SEL volunteered state-of-the-art equipment in addition to the expert engineering services. The equipment included a control cabinet

with control protection and communications equipment as well as a microprocessor computer for operators and dispatchers in the distribution center, two SEL-2401 Satellite-Synchronized Clocks, two SEL-351R Recloser Controls, and two SEL-3505 Real-Time Automation Controllers (RTACs). SEL also donated management software for the control and management of the two existing Brčko reclosers that were mounted on the 10 kV Zovik and Potočari distribution lines. These lines were selected because they had the highest number of unplanned interruptions in electricity supply.

Simplicity was the primary design goal from the beginning of the smart grid program. In only two weeks, the team built a simple solution out of powerful technology that automatically identifies faults, communicates fault locations to utility managers, and initiates recloser controls to quickly restore electricity to affected customers.



Figure 1—Ilija Andric, president of the Gornij Zovik local community in Brčko, Bosnia and Herzegovina, says his village now enjoys safe, reliable electricity without going dark every time there's a storm (USEA/Komunalno Brčko for USAID).

“Thanks to direct GSM/GPRS connection between the distribution management center of our company and reclosers,” said a Brčko utility operator, “our engineers are always on time and know where the location of the defect is, which significantly affects the speed of repair on the distribution network and reduces the duration of interruptions in the supply of electricity. Thanks to this technology, it is possible to turn off only part of the transmission line to eliminate breakdowns.”

Project Findings

Data collected by JP Komunalno Brčko showed significant improvement in customer satisfaction with power quality. In a 2015 power utility division survey, 61.26 percent of citizens rated their satisfaction with their electrical service at the highest possible level. This increased to 69.10 percent a year later. In 2015, 60.99 percent of customers rated the stability of the electric power supply with the highest marks, increasing to 67.77 percent in 2016.

Since installation, the SEL DNA solution has operated multiple times. The System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) showed improvements of 64 and 65 percent, respectively. There was an energy not supplied (ENS) improvement of 68 percent.

According to the September 2016 Brčko progress report, “[t]here is also a big benefit when we are talking about planned works to power lines because we do not need...to send crews to manually make manipulations, but we can do it remotely from the distribution center. Also, we have many other benefits from installation of reclosers like better monitoring of measuring values from power lines that we did not have in the past [and] faster and easier detection of failures.”

Data collected by SEL sensors are used to benchmark improvements in the frequency and duration of system outages on the smart grid pilot project’s feeder against its historical performance. The potential benefits of this DNA pilot project extend well beyond the single feeder where it was installed. This technological innovation can be replicated and scaled up throughout Southeastern Europe, enabling more distribution system operators to improve their networks.

This project successfully proved that DNA technologies can decrease power distribution outages. Electric power supply is more consistent; outages are less frequent and do

not last as long; and maintenance costs are reduced. The reduced outages and outage times translate into lower electric rates for Brčko residents. The DNA technology from the smart grid pilot project has been left in place for the benefit of the Brčko community, and SEL continues to service this technology.

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About JP Komunalno Brčko

Javno Preduzeće (JP) Komunalno Brčko distributes electricity; processes and distributes water; maintains and develops public areas; and collects, removes, and disposes of municipal waste in the Brčko District in Bosnia and Herzegovina.

About SEL

Schweitzer Engineering Laboratories, Inc. (SEL) has been making electric power safer, more reliable, and more economical since 1984. This ISO 9001:2000-certified company serves the electric power industry worldwide through the design, manufacture, supply, and support of products and services for power system protection, control, and monitoring.

In 2015, the United States Energy Association (USEA) honored SEL with a corporate volunteer award in recognition of the company's participation in creating an innovative smart grid project in the Brčko District in Bosnia and Herzegovina.

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