

European innovation tackles power cuts

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Many European countries have just endured their coldest, most protracted winter in decades, and the importance of a secure and reliable energy supply has never been more evident. Additionally, bad weather can cause unprecedented surges in demand, especially at peak times, putting the electricity distribution industry under tremendous pressure to maintain supplies throughout the power network systems. When a fault occurs somewhere along the network thousands of people and businesses can be deprived of power.

The fault must be fixed as quickly as possible; to speed up the process, the electricity distribution industry is keen to move towards fully computerised and automated network management and control using modern Power Distribution Network Automation Systems (DINAS). The Slovenian and Serbian partners of EUREKA Project E! 3452 DINAS have advanced this aim significantly by developing a new generation of software and hardware tools capable of automatically locating and diagnosing a fault anywhere along a distribution network and rerouting the current to restore the power supply instantly.

Functioning in all environments

The project brought together the expertise and resources of five companies and research institutions: from Slovenia, Iskra Sistemi d.d. (lead partner) and Sipronika d.o.o., both developers and manufacturers of automation and system protection solutions and technologies for the power distribution industry, the Faculty of [Electrical Engineering](#) at the University of Maribor and Iskra TECHNO R&D; from Serbia, the

Faculty of Technical Sciences at the University of Novi Sad and the DMS Group Ltd., developers of distribution management system application software.

The project team undertook extensive research to determine how a distribution network behaved and reacted to different types of fault in different environments. Armed with this knowledge, they were able to develop algorithms capable of performing numerous complex mathematical and digital calculations at the fault's location to determine its cause.

"Power lines often run through remote or difficult territory such as mountains or forests, and engineers have to work methodically along the line until they locate the problem," says project manager Drago Končnik of Iskra Sistemi. "It's hard, time-consuming and very costly work. It's worst of all for consumers, though, who may be without power for up to several days in bad weather conditions, during the long and dark winter months".

What makes the DINAS system unique is that it automatically detects the fault in the current wherever it occurs in the power distribution network, isolates the faulty sector from the power line and restores power in a matter of seconds.

Advanced technology, automatic control

The system uses the latest microprocessor technology and complies with the most demanding electromagnetic compatibility standards to protect it from external interference, and to minimise its own impact on the environment.

The system's command centre is located at a power company's distribution network control centre, which is in charge of several distribution substations. The system comprises Distribution Management

System (DMS) Control software, capable of automatically restoring power; Field Remote Terminal Unit (FRTU) devices, mounted at the top of power line poles located along the power distribution lines; and fault current sensing devices placed along the power distribution lines.

Each sector of the distribution network is controlled by two FRTU devices which contain the algorithms necessary for detecting and isolating a fault that occurs in that particular area. The devices automatically issue commands to disconnect the faulty part from the network. Back at the control centre, the DINAS DMS Control software analyses the network's new status, automatically sets alternative distribution paths to powerless customers and issues commands to restore the connection.

"The entire system is more flexible, simpler to assemble and operate and requires considerably less maintenance, making it a more cost effective solution for power distribution customers," says Končnik.

Worldwide distribution potential

DINAS is already in operation with Slovenian and Serbian power distribution companies, which have confirmed significantly reduced costs and response times in restoring power supply. "For industry in particular, reliability and security of supply is economically vitally important, and also to be taken into account is the saving on the cost of the undelivered energy between power cut and restoration," says Končnik.

DINAS's speedy problem-solving and power restoration capabilities give it a major competitive advantage over existing systems and potentially a global market for sales, Končnik adds. "The FRTUs can be used in power distribution networks anywhere in the world because they are designed to fit all standardised input currents, voltages and supply

voltages, and to meet temperature, humidity and electromagnetic compatibility standards."

Accordingly, the project members have appreciably strengthened their commercial position in terms of access to new markets in Europe and beyond and are planning to roll out the system to their eastern European neighbours and the broader EU market, and beyond that Thailand, Malaysia and the Middle East.

Končnik reports that the project team's highly successful partnership was given an invaluable boost from EUREKA's support. "Thanks to EUREKA, we were able to reduce the costs and risks associated with the project, and increase its scope considerably. The EUREKA label also grants our DINAS system an internationally recognised status, which is proving a significant advantage when marketing the product."

Provided by EUREKA

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