

# Eidsiva Energi Modernizes Substation with Standards-Based Networking

Customer Case Study



## EXECUTIVE SUMMARY

**Customer Name:** Eidsiva Energi

**Industry:** Electric Utility

**Location:** Substation pilot project in Raufoss, Norway, with potential extension to 75 more sites

**Number of Employees:** 1000

### Business Challenges

- Aged infrastructure based on outdated communications networking
- Lack of visibility into remote locations based on isolated data
- Inability to adapt to new capabilities and modern service requirements

### Solution

- Cisco 2520 Connected Grid Switch

### Business Results

- Create blueprint for substation modernization across company
- Unify networks supporting legacy and next-gen applications
- Improved visibility to ensure uptime, reliability, and efficiency

Norway power company drives 21<sup>st</sup>-century efficiency and management with IEC-61850 digital bus for substation automation.

## Business Challenges

Eidsiva Energi is a regional power company based in Hamar, Norway, which produces, distributes, and sells energy to approximately 150,000 customers in the counties of Hedmark and Oppland. In common with utilities across the world, Eidsiva is modernizing its grid communications network to meet 21<sup>st</sup>-century demands for greater efficiency, reliability, and security. Recently, the company completed a pilot project to refurbish the systems of an aging substation, establishing a methodology to eventually migrate all its plants into a single IP-based communications infrastructure.

Eidsiva is among Norway's leading energy companies, producing approximately 7 TWh from 20 wholly owned and 24 partially owned plants; it also operates a 21,000-kilometer power grid including 10,000 stations and transformers. Over the last few years, the company has begun to transition all its facilities to a Multiprotocol Label Switching (MPLS)-based network. MPLS is a wide area network (WAN) technology that is especially useful to operators who need to integrate diverse legacy systems with next-generation utility applications. MPLS facilitates transport of most forms of traffic, penetrating down into the Internet of Things – from traditional serial-based technologies such as SCADA remote terminal units (RTUs) to today's IEC 61850 packet-based intelligent electronic devices (IEDs).

As the next phase of its MPLS project, Eidsiva began to study how to extend it as part of a digital communications network out to the substation, starting with a pilot project at its site in Raufoss. "The Raufoss substation came into our company as part of an acquisition, and had not been refurbished since the 1980s," says Odd Johan Mathisen, Eidsiva's project engineer, ICT infrastructure. "We decided to rebuild the entire control system as well as create an integrated communications network based on open-standards IP networking. We also determined that all work would be done by our internal team and vendor partners, to help us prepare to modernize across all of our sites."



The network was implemented by Cisco partner Datamatrix A/S, based in Norway, which specializes in installation of advanced networking architectures. The automation piece was led by Vaasa Engineering of Finland, a major provider of products and services for the Nordic power industry.

## Solution

The Eidsiva implementation includes a rebuilt communications network in the Raufoss primary substation, based on an IEC-61850 station bus. This is an increasingly used interoperability standard that enables a single protocol for multivendor substation systems. In a new multiringing topology to help ensure uptime, the IEC-61850 bus cohesively combines traffic to and from a variety of IEDs for protection, regulation, and control, including copper wire and fibre optics.

The bus is enabled by the Cisco® 2520 Connected Grid Switch (CGS), a ruggedized solution designed for harsh industrial substation environments. It supports both the IEC-61850-3 and IEEE 1613 interoperability standards, and offers a highly scalable quality of service for applications such as SCADA and GOOSE messaging. The switch provides tools for easy deployment and management as well as extensive instrumentation and remote diagnostic capabilities.

It also helps to protect data transmissions with comprehensive security. The CGS 2520 provides security features including advanced Cisco IOS® Software features such as support for the 802.1x standard, strict access control, port security, protected private networks, traffic controls, and file security to prevent unauthorized access and reduce operational costs of securing the network.

## Business Results

**Future-proofing station facilities – and the station team.** A major goal of the project was to start preparing the combined team to implement its new digital bus in substations across the company – a total of more than 70 sites. “Eidsiva has installed digital communications networks before, but this is when we started to develop hands-on experience regarding IEC 61850,” Mathisen says. “For the first time, this was not just a black box solution – we went in to understand the network and the movement of data traffic right down into the substation. There are some things you simply cannot learn in the lab; you need to implement solutions in the field to understand all the potential issues and gains.”

**Laying the groundwork for a standards-based substation infrastructure.** “An important learning from this project is that implementing today’s automation solutions takes an ecosystem of knowledgeable partners,” Henning Elvestad of Datamatrix says. “No one can rely on just one vendor anymore: Everything is standards-based. For this installation, we combined the technologies of several relay vendors and Cisco on the network, all glued together around IP and GOOSE messages.”

**Driving new levels of efficiency and uptime.** With complete visibility into the details of grid operation, utilities are in a better position to ensure reliability, manage power load, assess performance, and manage power output. These new capabilities make it easier for Eidsiva to serve customers with consistent, more advanced offers and service-level agreements (SLAs).

**Achieving costs savings and lower TCO.** “Cisco’s expertise gave us a good start in understanding how to structure and design this type of automation project to improve system efficiency and power output management,” Mathisen says. “This advanced functionality gives us a whole new level of visibility into substation functions, which will let us reduce the cost of operations and achieve a lower total cost of ownership.”

### Next Steps

The Raufoss pilot project now serves as the first version of a blueprint for Eidsiva’s journey to standardize its approach to building the next-generation substation. It also allows the company to streamline its ICT organization to support the utility operations more than ever before.

“IP-based digital networks are the wave of the future. In a world where so many pieces need to work together, it makes us more competitive to have a common architecture from station to station,” Mathisen concludes. “The reliability of MPLS is so good at combining all our different networks – the network is what we now standardize on, and this gives us a big advantage for the future.”



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