Remote monitoring and control for distributed renewable energy generation

On the way to zero downtime with zenon and Microsoft Azure

Managing remote power generation sites has its own particular challenges, not least in terms of the efficient monitoring of operations. Slovenian renewables producer Gorenjske Elektrarne has resolved these challenges using a novel and technologically advanced IoT solution which combines COPA-DATA's software zenon with Microsoft's Azure cloud services.

Gorenjske Elektrarne is a subsidiary of Elektro Gorenjska, one of Slovenia's leading energy utility companies. It specializes in the development of power from renewable sources, including solar and hydroelectric power. Given the nature of its power sources, many of the company's power generation sites are located in remote and difficult terrain. This can present challenges in terms of the monitoring and control of remote locations.

Gorenjske Elektrarne's use of COPA-DATA's SCADA software began in 2006 when a refurbishment project at Gorenjske Elektrarne's Soteska hydroelectric power station utilized zenon for the plant's local control and monitoring systems. The Gorenjske Elektrarne team were pleased with the improved system overview and reliability zenon delivered.

Jurij Čadež, Project Manager at Gorenjske Elektrarne, says: "zenon is a simple tool to deploy and extremely stable in operation. Trust and conviction in the solution are two of the many reasons we chose to standardize on zenon."

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>
> **JURIJ ČADEŽ, GORENJSKE ELEKTRARNE PROJECT MANAGER**

IMPROVED VISIBILITY HAS HELPED TO OPTIMIZE OUTPUT

The next refurbishment project was at the Sorica 125 kW Small Hydroelectric Power Plant (SHPP) in 2007. zenon was implemented as a local SCADA system to control operations, record key plant parameters, enable the visualization of the complete SHPP, alert engineers to alarm states and sub-optimal operation, and enable further operational analysis and optimization. The plant control system refurbishment with zenon resulted in an operational cost reduction of 30% and a 15% production increase through the elimination of downtime and sub-optimal operation.

Aleš Ažman, the Director at Gorenjske Elektrarne, says: "We have had a very good experience with the COPA-DATA solution. For us, it was important to optimize production costs and gain an overview of all operational parameters. zenon has helped us to achieve this and, in doing so, has helped us improve the power stations' output and reduce associated operational costs."

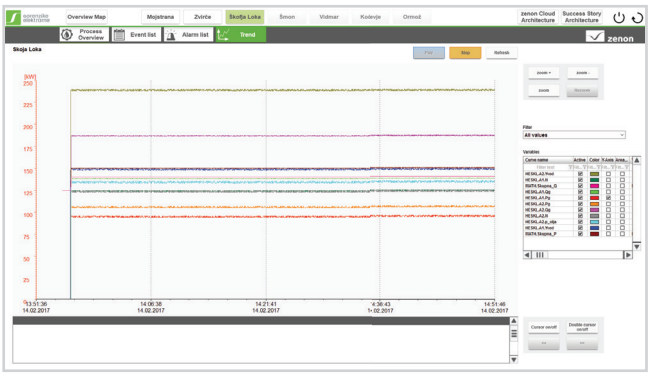
The team at Gorenjske Elektrane implemented the zenon monitoring and control solution internally. Aleš Ažman says: "The results of the team's work can be clearly demonstrated in the effects of the refurbishment – production improvements could be seen immediately after we put the project into operation at end of 2007."

CENTRALIZED CONTROL DELIVERS COST SAVINGS

The Sorica project spawned an initiative to improve the centralized and decentralized monitoring of all HPP operations, which ran from 2010 to 2013. Then in 2014 and 2015, an additional 23 photovoltaic power plants were connected to the central SCADA. zenon was implemented across the board to enable operational parameters, alarm management and live camera feeds to be displayed at the HPP control center in Kranj. Using zenon's web server and web client this information can also be viewed at any distant decentralized location with an internet connection.

zenon Webserver Pro allows the operators in the field to remotely connect to the central zenon SCADA to monitor and control the power plants from any location. This has enabled the main operational cost reduction. The insight that zenon delivers has enabled the team at the headquarters in Kranj to diagnose events on the power plants and prepare strategies before dispatching a team of field engineers to the location – saving valuable time and money.

zenon integrates live camera feeds of key locations for easy observation and analysis. Here, an augmented overview of the Soteska hydroelectric power plant and four detail views of the same plant are shown.



zenon's integrated reporting displays both real-time and historical key process parameters for easy analysis.

Aleš Ažman outlines further benefits: "We have seen a substantial improvement with our data following the zenon integration. All our maintenance engineering has been streamlined, operational costs have been reduced and are still reducing."

Jurij Čadež confirms: "zenon's 100% reliability has been great for us. The optimization project led to a reduction in downtime and sub-optimal operation. zenon has enabled us to remotely investigate and diagnose the problems before they can have a negative influence on production. Because of the risks associated with high water levels and flood water it is important to be able to control operations remotely and zenon has proved very useful for this too."

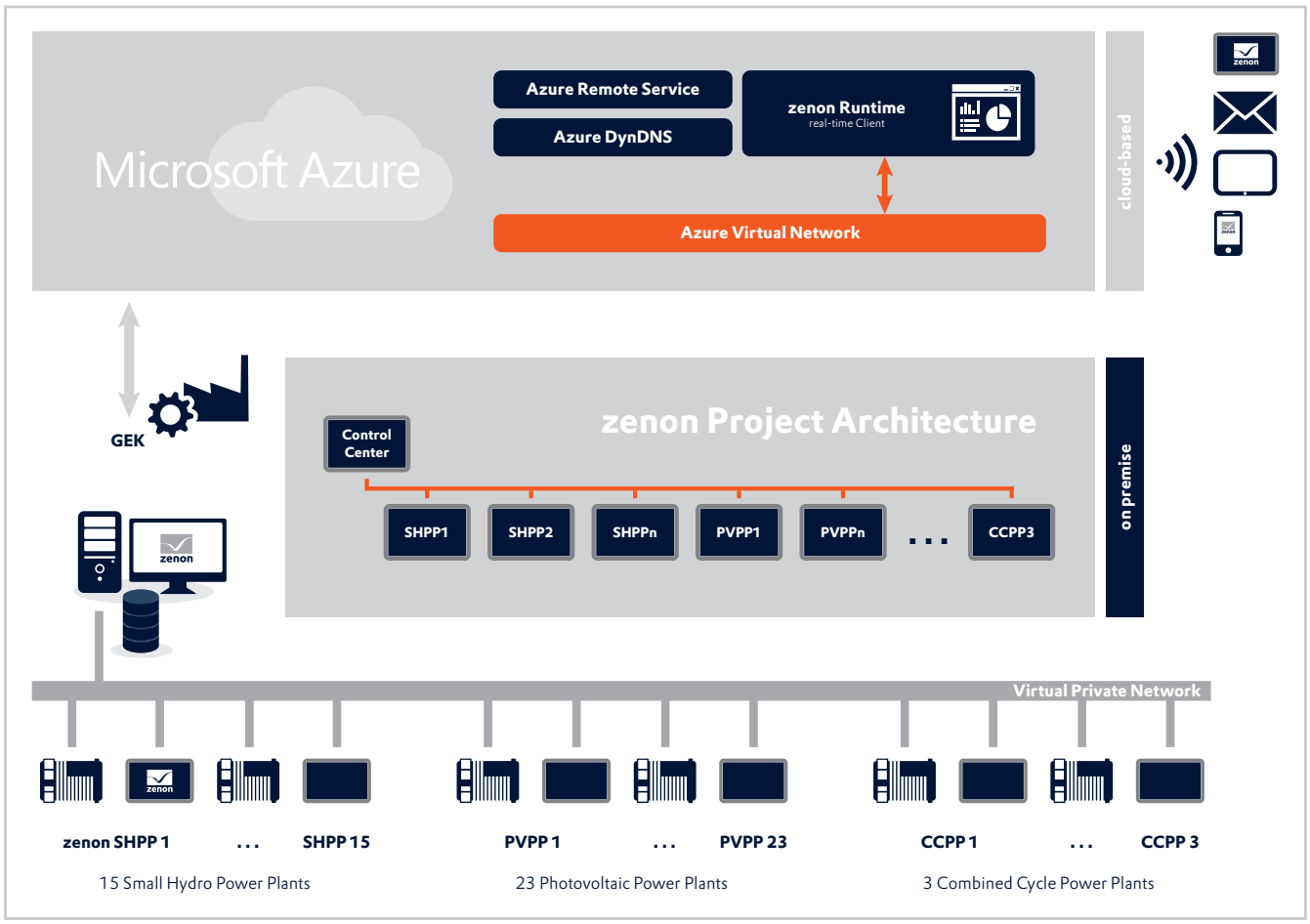
COMMUNICATION CHALLENGES REQUIRE CREATIVE SOLUTIONS

Over recent years, Gorenjske Elektrarne has successfully developed its power generation capabilities and it now owns and operates 15 hydropower plants, 23 photovoltaic plants and three combined cycle plants across Slovenia. zenon has been implemented across all utilities in the company's HPP operations to read the process data and metrics from the PLCs and to deliver essential power plant control and protection. The next step will be to integrate smaller plants and combined cycle plants.

Given the geographical constraints of Gorenjske Elektrarne's business, the company has had to deploy a mix of communications solutions to meet its requirements for a centralized overview of its operations.

It would be cost-prohibitive for Gorenjske Elektrarne to build its own communication network over such a wide geographic area, so the company has had to rely on IP-VPN over leased lines and, in some very remote locations, satellite connectivity. Satellite communications in particular are unreliable and zenon has had a key role to play in network monitoring and the security of communication equipment.

These challenges have forced the company to think creatively about how to achieve a reliable and flexible overview of its operations from any location. This led Gorenjske Elektrarne to explore the possibilities of using zenon in combination with Microsoft's Cloud platform Azure, including the Azure IoT Suite. Microsoft Azure offers a highly scalable platform to deliver corporate applications simply and cost-effectively from the cloud.



Gorenjske Elektrarne now operates 15 hydropower plants, 23 photovoltaic plants and three combined cycle plants across Slovenia. zenon has been implemented to read data from the PLCs and to deliver essential power plant control and protection. zenon is now fully integrated with Microsoft's Azure cloud services.

zenon is fully integrated with Microsoft's Azure cloud services. It provides a scalable platform which has been designed to help organizations to benefit from the scalability, agility and cost-effectiveness of cloud without the need to rewrite applications. Users can deliver corporate applications "as is" on any device without re-writing them; eliminating the need for major up-front expenditure and reducing the time it takes to get cloud solutions into production.

CLOUD DELIVERS INSIGHTS FAST

Gorenjske Elektrarne now uses zenon in combination with Microsoft Azure for fast and easy access to its control center. Now, the information from Gorenjske Elektrarne's control center can be visualized without delay on mobile clients.

Employees simply install remote clients on their internet-connected PCs, tablets or phones and are then able to securely access the zenon application. With little up-front investment and no specialized hardware, Gorenjske Elektrarne can ensure every member of the team who needs it has an operational overview. This overview consists of a real-time dashboard of the company's entire infrastructure across 36 distributed power generation sites.

Engineers and supervisors can access the information they need using their Android smartphones. The zenon application, running on Azure, delivers the right information they need in real time. This allows the team to react as quickly as possible and to take the best decisions based on reliable and high quality data.

Jurij Čadež says: "The application is extremely fast and responsive. I am very happy with the outcome of our latest zenon project using Microsoft Azure as a platform. It is very useful for our company."

The zenon application, running on Azure, delivers the right information they need in real time. Employees simply install remote clients on their internet-connected PCs, tablets or phones and are then able to securely access via Microsoft's Azure Remote Services.

Users can view alarms, events, trends and reports as and when they need to with minimum fuss. Azure automatically flexes with demand – so that occasional bursts of activity in response to an incident or alarm condition are fully supported with no loss of performance.

Jurij Čadež continues: "One of the reasons we chose to standardize on COPA-DATA's software is the excellent technical knowledge of the COPA-DATA team. This know-how underpins everything they do and we have complete faith in their solutions and their development path. We know that the COPA-DATA team will leverage the most promising new technologies early and, what's more, they don't do this for the sake of it; only where it delivers real tangible benefits for customers. This is what ensures that zenon solutions are reliable, efficient and easy to use."

REMOTE MONITORING AND CONTROL WITH ZENON AND MICROSOFT AZURE

- Local monitoring and control with reliable data
- Centralized control center with real-time integration of process data, live video and network monitoring information
- Integration with Microsoft Azure for fast, simple access to company-wide information
- Remote user access on the zenon application on Android smartphones
- Simple, rapid access to alarms, events, trends and reports wherever and whenever it is needed.