

Success Story

CENTUM VP boosts C.T.E. Bucureşti Vest
Combined Heat and Power Plant in Romania

Electrocentrale Bucureşti S.A.

Location:	Bucharest, Romania
Plant type:	Combined heat and power (CHP) plant
Capacity:	185 MW
Project type:	Revamp
Completion:	2020
Scope:	DCS for BOP and Škoda turbine controls

Executive Summary

Customer profile



Electrocentrale Bucureşti S.A. (ELCEN) plays an important role in the Romanian energy system as it is the main producer of thermal energy in Bucharest (90%) and also an important player in the national electricity market. It owns four thermal power plants ("centrală termoelectrică", C.T.E.): Bucharest Vest, Grozavesti, Bucharest Sud and Progresu, which produce electricity and heat by cogeneration.

Providing heating and hot water for the population is a general public service, so the company plays an indispensable role for the inhabitants of Bucharest. The thermal energy produced by ELCEN is intended to supply the capital's district heating system, meeting the energy needs of consumers. ELCEN provides thermal energy for approximately 565,000 apartments in over 8,500 blocks of flats and buildings, in which over 1.25 million inhabitants live, as well as for approximately 5,400 institutions, social facilities and other entities.

The electricity produced by ELCEN is delivered to the National Energy System, thus contributing to the country's energy security.

Commissioned in 1972, C.T.E. Bucharest Vest is located in the Romanian capital of Bucharest and is the third longest-running power plant of ELCEN. Since 2009 when the combined cycle heat and power (CCHP) unit was constructed next to two existing 125 MW plants, Yokogawa's CENTUM CS 3000 distributed control system, ProSafe-RS safety instrumented system, and Exaquantum Plant Information Management System have been ensuring the combined production of electricity and heat in full compliance with legal regulations for efficient recovery of heat from production processes, reduction of water and heat losses and reduction of internal electricity consumption, with high thermal efficiency.

Outline of the project

Yokogawa Romania modernized the control system at the C.T.E. Vest combined cycle heat and power plant to streamline plant operations by leveraging the latest technology standards on the market as well as reduce the emissions of the plant. The project was completed in a mere eight months despite its complexity and the difficulties under the prolonged Covid-19 pandemic that forced remote working. The acceptance tests and final delivery were done as scheduled, in the final month of 2020.

The plant can now be operated by new systems fully automatically either in electrical or thermal primary mode according to consumers' needs. These processes translate into a constant heat and hot water supply and increased comfort for Bucharest's citizens. C.T.E. Vest supplies district heating for six of Bucharest's main neighborhoods: Drumul Taberei, Giuleşti, Crangasi, Militari, Politehnica and Valea Cascadelor.

The Challenges and the Solutions

Challenges of Covid-19 pandemic

The project team included software and hardware engineers from Yokogawa Romania, the main automation contractor, and very supportive personnel from C.T.E. Vest. A major challenge in deploying the system when all work moved to the virtual space was the Covid-19 pandemic. Special protective measures were taken to ensure the safety of the team members while avoiding disruption to communication and commissioning. The team relied on remote support from Yokogawa's worldwide branches in the Czech Republic, United States, and Australia.

Automated plant and turbine startup and shutdown

Startup and shutdown procedures for plants and turbines are very complex and time-consuming, and place great stress on both personnel and equipment. To eliminate operator errors during these critical processes, the CENTUM VP distributed control system has automated plant and turbine startup and shutdown procedures. These are carried out in accordance with the logic design, and the human machine interface (HMI) of the CENTUM VP clearly shows the status of the sequence and the facility conditions. It also guides operators to acknowledge messages and alarms and trigger interlock sequences. Operator intervention during these automated processes is minimized, ensuring safe and smooth startup and shutdown. This greatly reduces operator workload and errors, speeds up the startup and shutdown times, and minimizes thermal and physical stress on the turbine.

The project is a real-world showcase of Yokogawa's turbine control solution applied to a Škoda steam turbine by means of reverse engineering, highlighting the company's expertise in turbomachinery control.

Backup system

Upgrades of the alarm management system in case of any incidents and an advanced cybersecurity program with an automatic back-up and recovery solution were put in place. The backup system enables uninterrupted plant operation, and the new graphical user interface ensures safe operation while the backup system is engaged.

One important benefit brought by the project is the improved energy efficiency of the gas compressor which varies between 0.5 and 1 MW/h depending on the operating requirements.

Sequence-of-events (SOE) station

All events are precisely recorded with millisecond accuracy and displayed in an SOE window for later analysis. This enables operators to assess problems, identify the root causes and request fixes by maintenance personnel.

Test system

When application software needs to be modified, the revised software must be tested before it can be downloaded to controllers, requiring a plant shutdown. To maximize plant uptime, Yokogawa provided a test system that runs the test functions of the CENTUM VP. This test system accurately replicates the plant control and graphical interfaces so that the software can be easily checked under the same conditions as with the actual plant system. It can also be used to train the operators.

Customer Satisfaction

An integrated solution consisting of Yokogawa's CENTUM VP control system and ProSafe-RS safety system increased the capacity and stability of the power plant and eliminated potential points of failure. The plant units were automated to ensure a high degree of flexibility in responding to fluctuations in demand and to enable automatic plant startups and shutdowns.

With this investment, C.T.E. Vest has extended the plant life by 10 years without major unscheduled downtime. The resulting financial savings enable ELCEN, the owner of C.T.E. Vest, to pursue future opportunities in this area.

Summary

In 2020, ELCEN selected Yokogawa's CENTUM VP control system and ProSafe-RS safety system for replacing the existing control systems for its C.T.E. Bucureşti Vest Plant. ELCEN is looking forward to further technology collaborations with Yokogawa.

System Details

Overview:

- Upgrade from CENTUM CS 3000
- Revamping of SCADA system to CENTUM VP's HMI
- Revamping of control system for a Škoda steam turbine
- Optimization of subsystem integration to eliminate many points of failure



CENTUM VP

- Field control stations
- Turbomachinery modules
- Operator stations
- Supervisor station
- SOE station
- Third-party subsystem integration (Modbus, Profibus, IEC 60870)
- Time synchronization with GPS master clock
- Plant Information and Management System



For more Information and Contact

[CENTUM VP \(DCS\)](#)

[ProSafe-RS \(Safety System\)](#)

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