Fernleitung Nahwärmenetz
Solarthermie

Solardächer
GMS-Schule
Erweiterungsbau
Hallenbad
Zentrale
Solardächer
Feuerwehr
Sporthallen A + B
Sporthalle A
Kies-Wasserlangzeitspeicher

BACnet-based Smart City solution for Eggenstein-Leopoldshafen

open automation systems

The Eggenstein-Leopoldshafen school center has undergone an impressive development, from its beginnings as an elementary school to the community school it is today. Driven by a future-oriented approach, it has undergone a fundamental modernization of its building automation and a pioneering digitalization of the technical building services as part of a smart city solution.

The challenges required an innovative solution for increasing energy efficiency and the use of (solar thermal) renewable resources. The Eggenstein-Leopoldshafen municipal administration commissioned PGA Automation with the comprehensive renovation of the building automation system and the expansion of the building management system as a BMS network control center. This concerns the heat generation from gas boilers, heat pumps and solar thermal energy of the local heating network, the school and sports centers, the indoor swimming pool and the fire department.

The foundation stone of the "Eggenstein-Leopoldshafen network control center" project was laid with the BMS project "Rheinhalle", where heating and ventilation systems were automated via Niagara. Due to its success, the OAS web portal was further developed as a network control center for the BMS and also implemented in the school and sports center.

THE REQUIREMENTS

The Eggenstein-Leopoldshafen school center, consisting of a community school, sports halls, an indoor swimming pool and the fire department, was to undergo a comprehensive renovation of the building automation system. The requirements included the renovation of the community school's building automation system with a focus on renewable energies and solar thermal systems, the implementation of solar local heating with long-term storage, as well as the renovation of the heating, ventilation and room automation systems. In addition, the school's auditorium was to be equipped with an air conditioning system. Sports halls A and B, the indoor swimming pool and the fire department were also to be integrated into the building management system of the local heating network.

> "The project represents a successful step towards sustainable, intelligent and efficient building technology.

Ralf Rostock
Geschäftsführender Gesellschafter
OAS Open AutomationSystems GmbH

FAST FACTS

Building type: School center (community school, sports halls, indoor swimming pool, fire department)

Client: Eggenstein-Leopoldshafen Building and Property Office

Project type: Renewal of building automation, smart city solution. Network control center for building management

Project scope:
• Network control center for building management
• Extension building connected to Niagara via BACnet
• BACnet MS/TP - Power I/O room automation
• Controller connection to BACnet via KepwareKepware
• Each building complex is in the cloud at our data center

Products used:
OAS JACE8-SBSIOM-2050, BACnet-Integration plattform

Special features: Southern Germany's largest solar system, integration of Johnson Controls, Kieback+Peter, cloud management by PGA system integrator

Authorized Distributor:
OAS Open AutomationSystems GmbH
System Integrator: PGA Automation
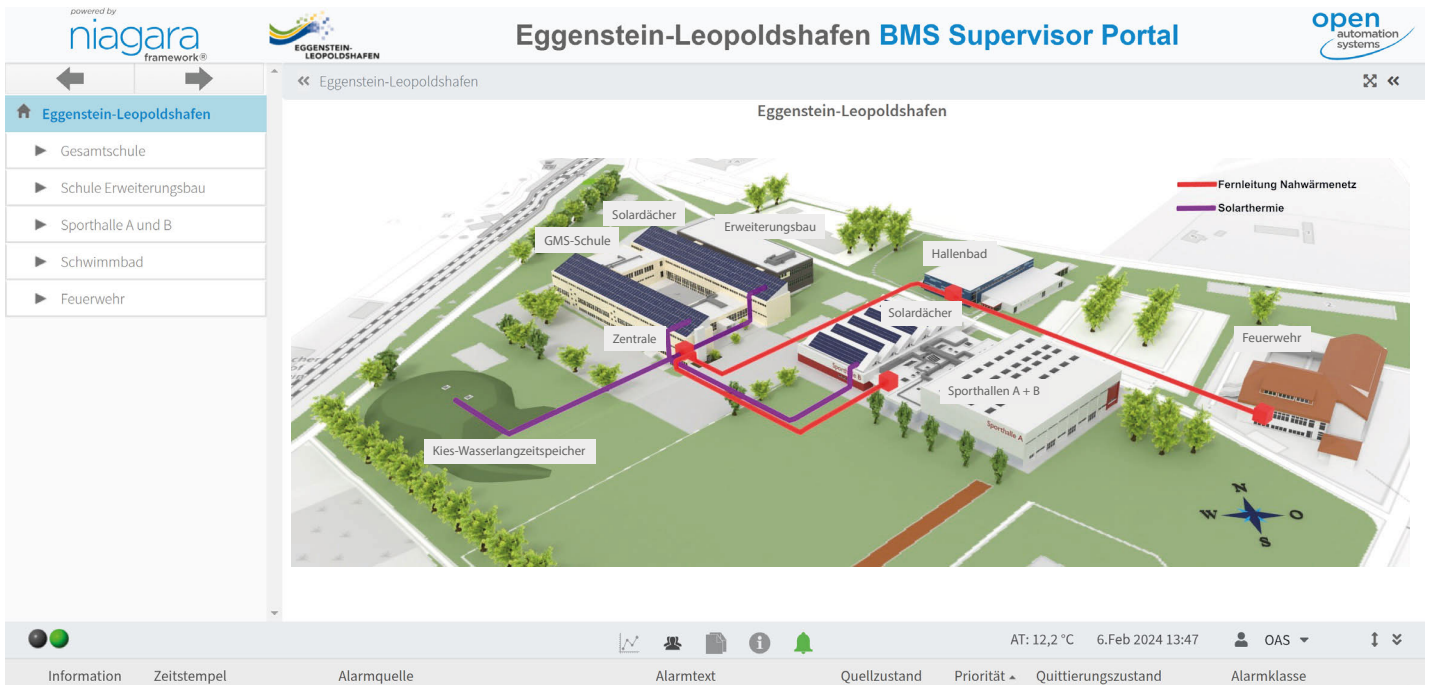
OAS web portal as network control center: Overview school and sports center Eggenstein-Leopoldshafen

THE OPEN AUTOMATION SOLUTION

This solution represents the start of a pioneering smart city project in which all systems were integrated via BACnet. The extension building is seamlessly connected to Niagara via BACnet. In the area of room automation, the Easy/IO was connected via BACnet MS/TP.

All existing third-party systems were successfully integrated and networked via BACnet.
The implementation covers the entire campus, which is now equipped with a metering system for various meters.

Primary installations

Essentially, all non-BACnet-capable automation devices (heat generators and distribution, solar thermal, HVAC systems) in 6 buildings and 12 ISPs (ASPs) were replaced with 14 AMEV-certified BACnet automation devices (JACE 8000/ OAS SBS JACE 8N4). The BACnet integration platform enables communication and integration of the various existing systems.
Automation station in accordance with the BACnet Building Controller (B-BC) profile, with native BACnet communication in accordance with DIN EN ISO 16484-5 (BACnet® server and client functionality); Ethernet (BACnet-IP) is used and transferred for communication. The system is certified according to AMEV certificate AS-B and BTL B-BC.

CLOUD SERVICE - OAS WEBVISUPORTAL

The OAS WEBvisuPORTAL from OAS Open AutomationSystems GmbH is the ultimate cloud automation solution hosted by one or more providers/data centers - automation as a service for all applications in the product range.

The integrated portal software and hosting offer a unique all-round service. Companies no longer need their own server or server structure on site.

The time-consuming and cost-intensive maintenance and servicing of the server is no longer necessary. This leads to considerable cost savings and eliminates system failures and data loss.
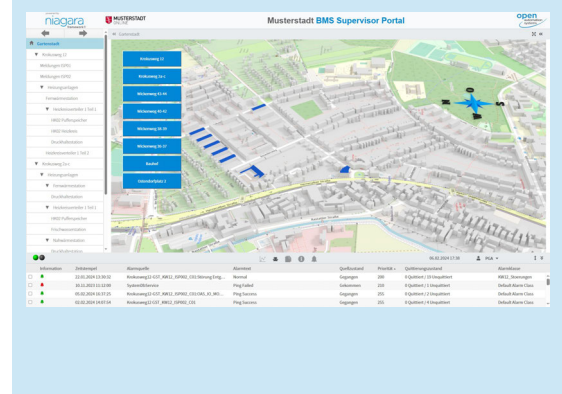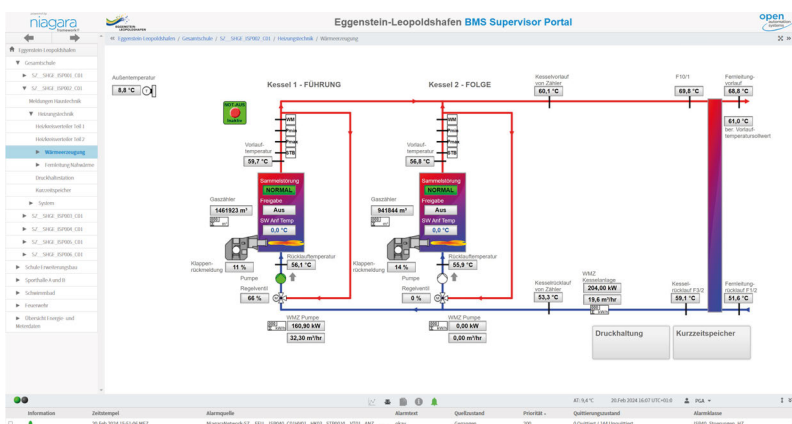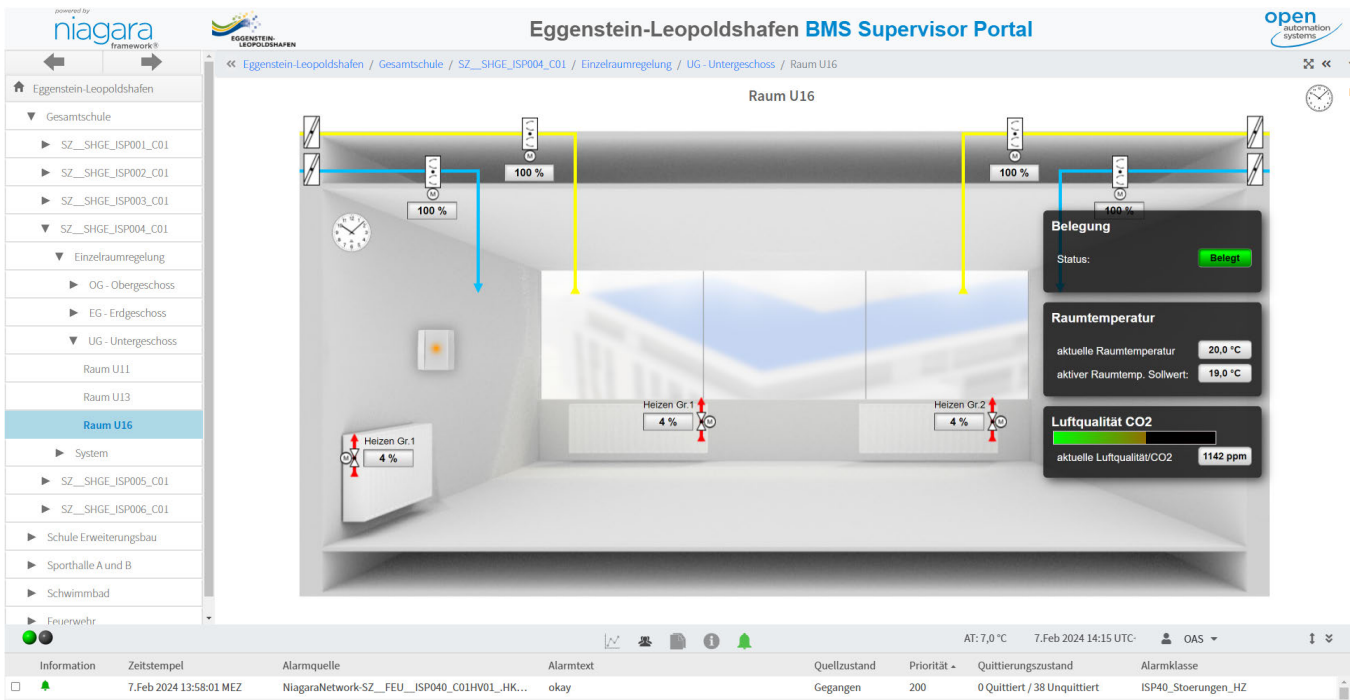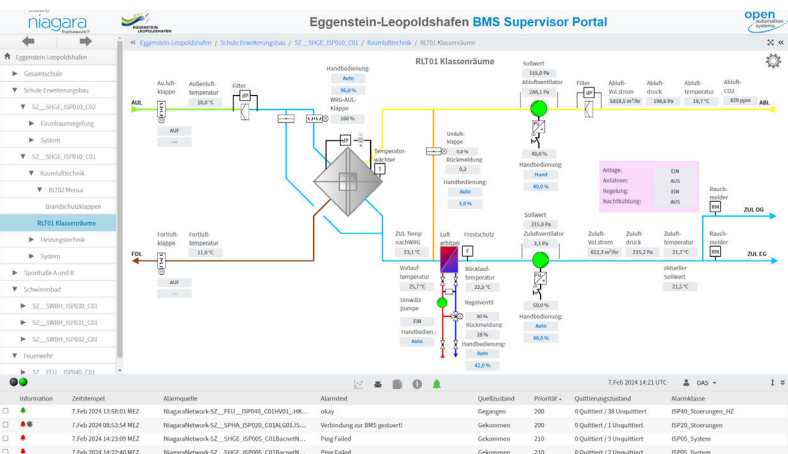
BACnet MS/TP JCI Easy IO room control

Room automation

The BACnet-based EasyI/O automation system from Johnson Controls was used for the room automation of the comprehensive school, consisting of classrooms, specialist and administration rooms. In the classrooms, the EasyI/O controllers regulate the temperature and air quality via CO2 sensors. A CO2 traffic light (Novos 3 from Thermokon) informs teachers and pupils about the air quality. If it is green, no action is required, if it is orange, the ventilation is switched on to optimize energy efficiency and if it is red, it is recommended to open the windows to further improve the air quality.

BACnet Integration Kieback & Peter

In the extension to the school, which was renovated in 2012, there is a BACnet-capable automation system from K&P for primarily heating and ventilation systems as well as individual room control for classrooms. Integration with the existing system takes place via BACnet/IP using two JACE 8000 integration platforms.

AIR QUALITY IN CLASSROOMS

The BACnet-based EasyI/O automation system from Johnson Controls was used for the room automation of the comprehensive school, consisting of classrooms, specialist and administration rooms. In the classrooms, the EasyI/O controllers regulate the temperature and air quality via CO2 sensors. A CO2 traffic light (Novos 3 from Thermokon) informs teachers and pupils about the air quality. If it is green, no action is required, if it is orange, the ventilation is switched on to optimize energy efficiency and if it is red, it is recommended to open the windows to further improve the air quality.

BACnet_IP: K+P integration heating, ventilation, individual room controls
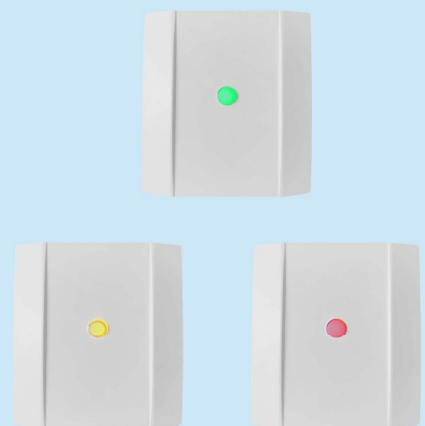
powered by niagara framework® | EGGENSTEIN-LEOPOLDSHAFEN | **Eggenstein-Leopoldshafen BMS Supervisor Portal** | open automation systems

« Eggenstein-Leopoldshafen / Gesamtschule / SZ__SHGE_ISP002_C01 / Heizungstechnik / Wärmeerzeugung / BACnet_Pumpe_Kessel_1

BACnet Pumpe

Betrieb

aktuelle Betriebsart:	Constant_Speed
Auswahl Betriebsart:	Constant_Speed
aktuelle Regelquelle:	Control from Bus

Betriebsmodus
Auto
Hand Aus
Hand Min
Hand Max

Regelquelle
Bus
Lokal

Regelsignal

Regelart Sollwert :	geregelter SW
fester Pumpen Sollwert :	5,5 m
Ratio: Pumpen Sollwert Temp.diff. Min :	5,0 Δ°K
Ratio: Pumpen Sollwert Temp.diff. Max :	20,0 Δ°K
Ratio: Pumpen SW Vol.Strom Min :	14,0 m³/hr
Ratio: Pumpen SW Vol.Strom Max :	30,0 m³/hr
Ratio: Pumpen Sollwert Ausgang Min :	0,0 %
Ratio: Pumpen Sollwert Ausgang Max :	100,0 %
Sollwert Volumenstrom :	24,4 m³/hr
resultierendes Regelsignal out:	100,0 %

Abhängig von der Betriebsart ändert sich die Umrechnung des Sollwertes. Die Pumpe erwartet immer ein Signal von 0-100.
Soll zB die Förderhöhe vorgegeben werden, muss diese in 0-100 umgerechnet werden.

Wärmemengenzähler

externe Vorlauftemperatur:	71,7 °C
Rücklauftemperatur:	57,0 °C
Differenztemperatur:	14,7 Δ°C
Volumenstrom:	30,20 m³/hr
Wärmeleistung:	516,65 kW
Zähler Wärmeenergie:	- -

Allgemeine Daten

aktueller Anlagendruck:	0,32 bar
Volumen:	49468,00 m³
Motordrehzahl:	2595,00 rpm
Betriebsstunden:	2918,00 hr
aktuelles Regelsignal:	99,2 %

elektrische Daten Pumpe

P-Eingang Pumpe:	447,00 W
Zähler Energieverbrauch:	666,00 kW-hr

Information	Zeitstempel	Alarmquelle	Alarmtext	Quellzustand	Priorität	Quittierungszustand	Alarmklasse
	7.Feb 2024 13:58:01 MEZ	NiagaraNetwork-SZ__FEU__ISP040_C01HV01_.HK...	okay	Gegangen	200	0 Quittiert / 38 Unquittiert	ISP40_Stoerungen_HZ

AT: 9,9 °C   7.Feb 2024 14:29 UTC-   OAS

BACnet MS/TP   Pumps

BACnet Pump

BACnet-capable boiler circuit pumps (high-efficiency pumps) from Biral were used to optimize the efficiency and functionality of the boiler system. The pumps are integrated via the BACnet module from Grundfos.

Energy monitoring

There is a comprehensive energy monitoring concept for the entire project, which includes the replacement of all heat meters and the addition of gas, water and electricity meters.

One of the largest solar thermal systems in southern Germany

The reactivation of one of the largest solar thermal systems in southern Germany is part of the project. It is the local heating network for the school and sports center with indoor swimming pool and fire station. Solar thermal collectors generate climate-friendly heat over an area of 1,600 square meters. A gravel-water storage tank enables a solar coverage rate of 35 percent over the entire year.

One of the largest solar thermal systems in southern Germany

Overview Eggenstein-Leopoldshafen: Smart City Solution

THE CUSTOMER BENEFIT

The introduction of a green solution at the Eggenstein-Leopoldshafen school center improves sustainable energy efficiency and enables holistic monitoring and control of the building technology using BACnet® and Niagara-Framework® by integrating automation solutions as well as consumption data acquisition and monitoring.

This comprehensive solution establishes the school center as a leader in the areas of intelligent building technology and sustainable smart city integration. In addition, the project represents a technological modernization that already meets the requirements of § 71a of the Building Energy Act (GEG) and represents an important step towards the future of sustainable energy supply and intelligent building technology.

ABOUT OAS

OAS Open AutomationSystems GmbH is your Tridium Authorized Distributor for open energy management and building automation systems for the end-to-end digitalization of technical building equipment. Our cloud-based portal solutions offer secure, reliable and trouble-free system integration with a high level of user-friendliness. Our modular Niagara Framework® components and OEM product developments communicate with BACnet® and other common protocols and offer limitless integration from the field level to the automation level to the cloud.

ABOUT PGA

With more than 20 years of experience, PGA Automation plans, PGA Automation develops and implements fully integrated system system solutions across the entire spectrum of modern digital automation technology. As a system integrator and solution provider, PGA Automation offers complete end-to-end solutions for all applications in process and industrial automation, room and building automation, environmental, water and wastewater technology, energy management as well as web-based BMS, HMI, SCADA and management solutions.