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Automation & Information Solutions

CASE STUDY

MICROGRID CONTROLS END CAMPUS BLACKOUTS

Ongoing power outages on Union College's Schenectady, NY, campus were disrupting everything from research projects to hockey practice. To achieve the stable power flow the college required, Union needed not only its own power generation facility but also a robust control system to regulate distribution to critical buildings across the campus-wide network.

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A project of this scope required a broad skillset. Integration would need to both align and coordinate the complicated array of systems and subsystems at work in the combined heat and power facility and carefully synchronize and control load settings for the campus microgrid, while also weaving a unified software backbone throughout the system to keep the microgrid/power automation processes running at peak efficiency. In total, this required the careful coordination of dozens of discrete systems from dozens of vendors, each requiring deep expertise to properly configure.

An unstable power supply can disrupt any environment, but in a university setting like Union College—with over 2,000 students depending on the infrastructure to help them complete their studies—the stakes are especially high. With multiple blackouts striking campus every year, every aspect of student life and campus operation was impacted—from research and science labs where stable conditions are essential for success, to classroom and residence hall activities, to sustaining conditions for the school's beloved hockey team.

To improve this situation, Union College had to go off the grid, creating its own, sustainable power facility that generates a stable and consistent supply for all parts of campus. From there, it needed a robust control system in place to generate that stability long into the future.

THE PROBLEM

The fundamental problem at Union College was its dependence on an unreliable off-campus power source. With the help of a $2 million grant from the New York State Energy Research & Development Authority, this issue was addressed with the construction of a new heat and power generation facility. This complex system is designed to harness both gas turbine and steam boiler systems to ultimately serve the needs of the full campus.

The real challenge, however, was far more daunting than a capital investment, even one as significant as this.

To maximize both electrical and thermal efficiency across campus, Union College needed a system capable of synchronizing, monitoring, and controlling each piece of the facility and its output, plus communicating status and analysis back to operators to keep the power and heat flowing constantly and consistently, particularly to essential buildings.

THE SOLUTION

There were two primary components of this project: a Plant Control System (PCS) for Union College's new combined heat and power facility and a Microgrid Controller (MC) that would effectively monitor and control the output of that facility. For these components, RoviSys was responsible for designing, engineering, procuring, and delivering each piece of the system and for each step of the installation process, from factory acceptance testing to site checkout.

The PCS side of the project was built on a Rockwell Automation-based control system designed to monitor and control all plant equipment, including data acquisition from each component. These controls interface with the full scope of the complex facility, from the gas turbine generators and heat recovery systems, to boiler feed pumps and air compressors, to HVAC systems, lighting, and data communication equipment.

Once installed, this control system coordinated the operation of each component and provided operators with real-time insight into their status, which provided the first step to uninterrupted power distribution across the Union College campus.

The next step was the integration of the Microgrid Control system, which added the next-gen efficiency the college required. By adding capabilities to monitor, synchronize, and protect both power distribution and the metering and control equipment it required, the MC provided the customer with the ability to shed non-critical loads from the system to feed consistent power to essential buildings across the grid.

Combined with the PCS, this covers the full cycle—from generation to distribution to end use, all in a highly controlled, optimized system designed to prevent disruption wherever power is most critical.

THE RESULT

The primary goal of this investment was to end the frequent blackouts and provide Union College students, faculty, and essential research facilities the stable power source they required. Switching to this tightly controlled and monitored microgrid system, the college was able to do just that. The system keeps the primary turbine running with a greater than 90% uptime, which has alone reduced outages by 80%.

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