McCormick provides efficient municipal services

Power management controls energy costs and distributed generation

McCormick, South Carolina, near the Georgia border, is the seat of McCormick County. The town's Commission of Public Works operates a number of infrastructure systems, including a town-owned wastewater treatment facility and a distribution system for electrical energy that it purchases in bulk from South Carolina Electric & Gas (SCE&G). Recently, the wastewater treatment facility was expanded to handle flow from neighboring developments, as well as its own water supply. Because the facility uses a UV decontamination system, electrical power reliability is critical to the safety of the water supply; without power, there is no decontamination process.

Because it also acts as an electrical power distributor, the Town of McCormick had a unique opportunity to manage its wastewater treatment facility and its electrical distribution system symbiotically. By controlling load in the wastewater treatment facility and co-generating power out into the electrical distribution system, the town reduces its peak demand levels, thereby avoiding high peak demand charges and lowering its overall cost of electricity.

Stepped generation tailors its output to demand, minimizing wasted capacity and money.

An innovative solution

The McCormick Commission of Public Works came up with an innovative solution to maximize their investment in the necessary generation assets for the wastewater treatment facility. Instead of installing a basic generator with simple on/off functionality, which would be incompatible with the peak-shaving scheme they had in mind, they chose a more sophisticated system that offered a "stepped" approach to generation.

The installed 1000 kW Cummings diesel generator offers seven stages of functionality, from off at Stage 0 to maximum generation at Stage 6. A 2,500-gallon fuel tank was also installed to provide a substantial reservoir for the generator in case of an emergency interruption in power from SCE&G.

Schneider Electric™

Monitoring energy usage and demand

To complete the peak-shaving system, a power monitoring system was also required. They installed a system from Schneider Electric, comprised of two power meters and power management software. The system provides the complete data and information-gathering network that is needed to run McCormick's integrated power and water treatment facilities. It acts as the central nervous system, allowing individual elements to work in conjunction toward the goal of cost-effective and reliable municipal services.

Accurate metering is essential

One power meter is used to monitor the incoming utility service at the main SCE&G substation, where the utility load for the town is monitored. This meter provides an accurate reading of utility power levels for demand control, as well as providing detailed data that can be used for bill verification to ensure accurate billing on the part of the utility. The other meter monitors and controls the generator at the treatment plant. A workstation running the power management software is located at the treatment facility. The substation meter is connected to this workstation through a continuous modem link; the generator meter is connected through RS-485 serial connection.

The generator switches on when the utility reading reaches a set-point value defined in the power management software. The generator output makes up the difference between the current load (power consumed) and the defined peak-shaving setpoint. As demand grows above the setpoint, the generator is stepped up to increasingly higher output levels. When demand levels drop, the generator switches down to lower stages until it switches completely off. The stepped approach allows the generator to tailor its output to best meet the demand, minimizing wasted money on fuel and generator maintenance.

Relevant information only

A number of specific, customized screens and functions (frameworks) were created to maximize the hardware and software elements of the system. These included processes to verify the accuracy of the substation meter and to calculate continuous demand levels for each 30-second period, as well as frameworks to enable communications and control functions for the generator. Because the frameworks are specially designed for McCormick's application, the screens provide only the information needed, without confusing users with irrelevant information or unnecessary data.

The software system provides easy-to-use graphical screens that provide a simple interface to a wide variety of information. For example, the main screen shows the current reading from the substation meter, the current reading from the generator meter, and the current status of the generator itself, including its operational stage.

Easy data viewing

From the main screen, users can quickly access alarm information, reports and master controls, as well as connect or disconnect the modem link to the substation meter.

Subsequent pages offer more detailed information and control. This includes a manual generator on/off switch, generator run-time controls to limit how long the generator can run without interruption, information on the maximum demand levels pre-set for each month, and the current peak demand level. Users can easily check or modify any setting, no matter how detailed, through the logical and intuitive system structure.

Intelligent system saves money

The power management system is also intelligent, automatically making adjustments to optimize demand charges. If the peak demand level for the month is exceeded, the peak setpoint is re-set at the new higher level, so that the facility doesn't run the generator when it is already paying the demand charges for that level of power from the utility. This saves the town money by reducing fuel usage, and saves time and effort because the automated function means that no person is required to constantly monitor the settings, checking for potential inconsistencies.

Cutting-edge technology creates a dynamic energy management solution.

Remote access saves time

The system's web-enabled communications allow Bernard Welborn, the administrator for the McCormick Commission of Public Works, to oversee the system remotely, dialing in daily through his laptop from his home or office. He can monitor conditions, adjust setpoints, and check on fuel levels without having to drive out to the waste water facility site. This ensures a fast, effective response to changing condition, without unnecessary and wasteful travel time.

Small town shows forward thinking

McCormick may be a small town, but its use of cutting-edge technology to create a dynamic energy management solution demonstrates its forward-thinking innovation and world-class leadership.