



A Manhattan Property Takes Charge of Energy Use



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A leading real estate investment trust manages more than 60 office properties across seven major U.S. cities, and it has a portfolio that includes a prestigious 50-story building in downtown Manhattan.

The property manager wanted to improve the way energy was used and conserved within the building, find a cost-effective way of tracking actual utility usage by each tenant, and do so without adding significant overhead in meter reading or other administrative costs.

Built in 1970, the office tower occupies almost 2.5 million square-feet and was extensively renovated in 1995. Energy used by tenants was being measured by a disparate collection of 54 meters scattered throughout the building, and each meter had to be read manually.

Incorporating this legacy apparatus was a challenge, but one successfully met by installing a Square D PowerLogic energy and power management system.

Accurate Tenant Submetering

Each of the tenant meters has a kWh pulse output linked by Ethernet to one of several intelligent PowerLogic power and energy meters. From the kWh pulse value, the meters use counter modules programmed with the appropriate pulse weight to calculate an accumulated kWh value.

This kWh value is then differentiated using an arithmetic module (current second's kWh value, minus previous second's kWh value, divided by 3600). This gives an instantaneous value that is connected to a Sliding Window Demand (SWD) module to give an accurate 15-minute kW demand value. From this information, the customer wanted to see the 15-minute kW Sliding Window Demand; the maximum demands for On Peak, Off Peak and overall; and the kWh accumulated during On Peak, Off Peak and overall. In addition, the system programmed the maximum demand and the kWh accumulators to be reset automatically at midnight on the first of each month. Engineers achieved these requirements using the system's advanced Energy and Demand VIP framework.



Tenants With Multiple Meters

Building tenants that have several meters measuring their overall load have the total kWh calculated simply by summing the kWh from each of the meters. Calculating maximum kW demand for these tenants, however, is more problematic.

Traditionally, their maximum demand would be calculated as the sum of their maximum demands on each meter. This, of course, leads to an unfair billing situation because the maximum demand on each meter may have occurred at different times of the day.

Tenants wise to this hit-or-miss arrangement asked to be billed on a coincident demand basis, where the total demand is calculated as the sum of the current 15-minute kW demand values. The tenant's real maximum demand is the maximum 15-minute value of this sum total. The PowerLogic® energy and power system determines this maximum value by summing the 15-minute Sliding Window parameters calculated in the pulse counting meters within the VIP, then connecting a maximum module to that sum. A challenge to this method is timing; the meters are synchronized to within a few seconds of each other, but the 15-minute SWD value is updated on the 15-minute boundary. The system must be able to account for SWD values that happen a few seconds early, or a few seconds late, so a lockout period automatically occurs one minute before and one minute after the 15-minute window.

Staying Cool

Building managers had significant challenges with their previous chiller systems, but they now operate a heavily redundant chilled water plant. This combination of steam turbine chillers, electric backup chillers, plate and riser heat exchangers, and supply fans (used to supply the building with air conditioning) can be a major energy consumer and requires careful control and monitoring.

The system must determine how much electricity and steam is being used to generate the chilled water, as well as calculate how much chilled water is being generated. The property manager sells air conditioning to tenants, so the system has to indicate how much profit (if any) is made from these sales and monitor the associated equipment operation by keeping track of the real-time hardware conditions.

A combination of PowerLogic® ION7550 and PowerLogic® ION7330 energy and power meters takes care of this, drawing on data from BTU meters via Modbus Master to determine instantaneous chilled water tonnage (equivalent to kW) and accumulated chilled water tonnage (equivalent to kWh). Real-time information is also gathered in the form of pulse inputs taken from steam meters. Using a method similar to the tenant metering system, a counter indicates how many thousand pounds of steam have been used thus far in the current month (also equivalent to kWh).



Seeing the Big Energy Picture

In addition to the real-time and historical data logging system, and the standard energy usage displays supplied by the PowerLogic ION Enterprise® system, the property manager had a need for almost 30 customized reports. These include daily and monthly summaries for various aspects of the chiller plant (chillers, heat exchangers, supply fans, electrical meters, steam meters and BTU meters) and individual tenant meter energy and demand summaries.

Through a series of real-time and historical data displays, charts and tables, the system provides, for the first time, an integrated look at how, when, and where the whole building is using energy. Building managers now use accurate energy-usage information to compare real-time and historical data for each tenant space, to conserve energy, reduce costs, and control usage during periods of peak-demand — staff can turn off non-critical equipment such as lighting or chillers in designated areas. The system also allows plant managers and maintenance personnel to monitor operation of the building's chiller plant, steam usage, and automatic transfer switches.

The PowerLogic® system has effectively removed the guesswork from energy usage calculations. It has replaced the unreliable, labor-intensive job of manually reading an assortment of meters with a smart, fully automated, affordable solution. Scalability is no problem as the system can grow or adapt to changes in the tenant population or any changes to rentable space. The Manhattan property now uses energy as efficiently as possible while maximizing comfort and convenience for its tenants, as well as ensuring they pay only for the amount of energy they actually consume.

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