Application Note: Load Aggregation of Multiple Facilities

Description of application: Data acquisition systems installed in multiple buildings provide energy usage information to a remote database. The information from these buildings is aggregated to produce a single electrical bill as if the individual buildings were one single facility.

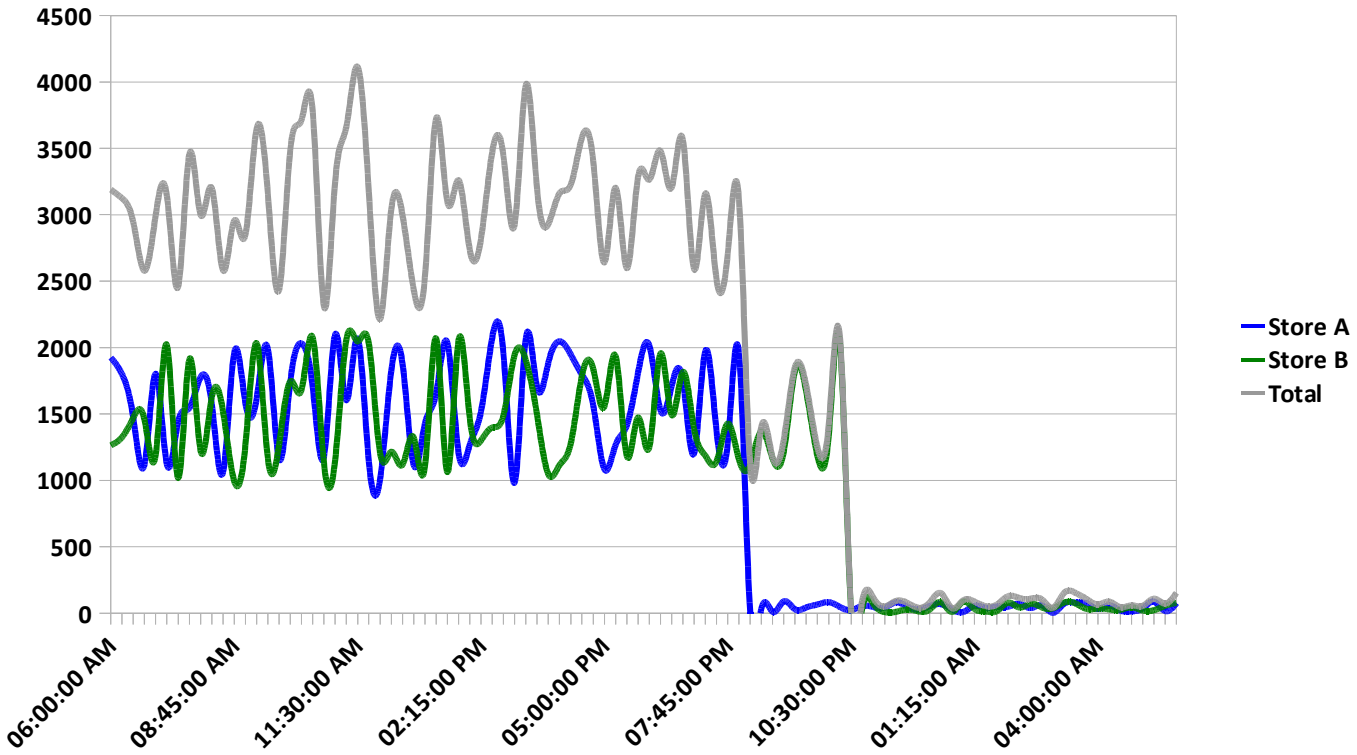
Background: During the days when deregulation of the electric industry was all the rage, there were a number of factors cited as benefits to deregulation: lower costs, better service and a wider range of offerings for the consumer. Among the biggest projected winners from deregulation were the many companies with multiple smaller locations scattered across one or more regions in the U.S. In theory, these companies (e.g., convenience stores, big box retail stores and restaurants) would be able to dramatically reduce their electricity bills by combining the consumption of some or all of their locations into a single account. Thus, a company with 100 stores of 10,000 square feet would have a similar rate structure to a single location with 1,000,000 square feet and thus would benefit from significantly lower rates. In addition, these companies would be able to get bids from multiple competitors to supply the power and thus would gain even more benefit from competition.

As just about everyone knows, the pace of deregulation has slowed considerably, to say the least. Disastrous outcomes such as those experienced in California in the first summer after deregulation have led other states to reconsider deregulation (really "reregulation") and to attempt to apply different models to achieve the benefits of a competitive power grid with a minimum of volatility in the supply and cost of electrical energy. In anticipation of coming deregulation, some utilities have begun to offer existing customers the option of aggregating some buildings. It is also fairly safe to say that some form(s) of deregulation will come into the market over the next few years and it will be beneficial to build a database of energy usage for owners of multiple facilities.

The actual price a utility is willing to charge for electricity is dependent on a number of factors, among them:

- Geographic location and number of locations to be supplied
- Total consumption (in KWH) of electricity for a given period of time (typically one month)
- The load profile (or load shape) of the electrical demand for a particular interval (typically 15 minutes). This load profile is particularly important to the utility as it helps to determine just how much power (in KW) the utility must have on-line at any given time to meet the needs of its customers. Customers who consume electricity during off-peak times are likely to receive lower rates than those who use electricity during peak demand periods.

How does it work: In its simplest form, the utility simply adds the consumption for all locations and also compares the load profiles to determine peak demand intervals for the potential customer. A typical load profile is shown below for two stores:



Using the data from load profiles such as those shown above, the utility can determine the total load (shown in gray above) that the utility will experience if both of these stores are on the grid. If, for example, Stores A and B had higher load requirements in the nonpeak hours (say 3:00 AM), the total package to be offered by the utility is likely to be far more attractive than if the profile is similar to that shown above.

Benefits: As with most products, consumers who purchase more electricity from a single supplier tend to get lower prices and this is reflected in the different rate structures offered by utilities to commercial and industrial (C&I) customers. C&I customers who are able to aggregate multiple locations benefit from being able to purchase electricity at a much more attractive rate schedule than they would buying power for each location separately. This can also result in lower costs for handling the purchasing as the bills will come from a single source and the costs of handling and paying multiple vendors is greatly reduced.

Customers who have installed metering systems to monitor operational performance (see "Accountability metering" application note) have the added benefit of developing a load profile as part of the metering program. Since the information necessary for developing load profiles is the same as that gathered for operational monitoring, the customer has the information required available immediately and thus is saved the time and expense of assembling hundreds of utility bills for utilities to bid on.

The utility benefits from adding customers (preferably those with attractive load profiles) to the grid and from the lower cost of billing a single customer for multiple locations, minimizing the need for billing multiple locations. The utility can also afford to spend money on automating the gathering of energy information as these costs can be spread across multiple stores for a single customer.

Drawbacks: The biggest issues for C&I customers considering load aggregation are:

- Gathering the load profile information necessary for utilities to put together proposals
- Evaluating a potentially wide variance in rate structures from different utilities
- Evaluating and managing the costs of service from a single supplier to a variety of locations
- Making commitments for longer term contracts

For the utility, the major hurdles are:

- Potentially losing an existing customer to a competitor
- Having to provide support for geographically disbursed locations
- Installing and maintaining a system for reading and billing from multiple locations to a single client
- Accepting a lower margin on each location in exchange for getting or keeping the customer

Installation requirements: Depending on the requirements for additional information beyond energy consumption and demand, the typical installation for load aggregation at each location is:

- AquiLite™ data acquisition server (DAS) from Obvius to collect pulses from newor existing electrical meters
- Pulse outputs from new or existing meters
- Phone line or LAN connection for communication to remote server

Reports: Reports for load aggregation are relatively simple and consist primarily of a summary bill each month, backed by graphical or tabular presentations of detailed load profile information for some or all of the locations.

Analysis/Actions: Unless there are concerns or disputes over the bills, there is little analysis or action required for the billing of the aggregated loads. The customer and/or the utility may, however, use the load profile data to provide additional benefits such as ranking the different facilities ("racking and stacking") or using the load profile information to establish priorities for energy studies and retrofits.

Costs: For a simple load aggregation project, the typical cost for each location would approximately be*:

- AcquiLite™ EMB DAS - $1000
- Pulse from existing meter – depends on the utility (may be anywhere from free to $1,000 +
- [Optional if no existing pulse] Pulse from new shadow meter - $600 to $800
- Data storage and reports – typically included in the billing and rate structure

** General figures based on available information; contact Obvius for the latest pricing*

Notes/miscellaneous: As mentioned above, the slow pace of deregulation has limited the opportunity for facility managers to take full advantage of load aggregation, as most utilities have not been forced to make aggregation available. It is important to note, however, that C&I customers who adopt an energy information plan in order to take advantage of operational savings will benefit from having load profile information readily available in the future when aggregation does become a viable option in more locations.

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