

For more than a decade, electricity prices have alternately spiked and crashed. As a result, large users of electricity who take a passive approach to managing their electricity supply face significant difficulty in budgeting for, and managing, their electricity costs.



Some hope that large supplies of inexpensive natural gas will lower electricity prices for good. However, relying solely on this hope may not be prudent. We have seen hurricanes or pipeline constraints disrupt natural gas, sending electricity prices soaring; we have seen coal piles freeze, with similar impacts on electricity prices. Many power plants will retire in the next few years in response to new environmental requirements, creating the potential for volatility in electricity prices.

Taking a more proactive approach to managing electricity consumption will reduce and stabilize electricity costs, bringing greater certainty to budgeting for those costs. The combination of advanced technology, market knowledge, and automation supports turnkey energy management solutions that respond to, and accommodate, business constraints and priorities.

Using Automated Energy Optimization to Maximize Cost Control and Economic Opportunity

Early efforts to manage electricity consumption were reactive and did not take into consideration the user's needs, goals or capabilities. Typically, those efforts would result in the curtailment of an entity's electricity use when the electric utility or the operator of the regional power grid was trying to relieve stress on its own system. The potential size of the savings to the customer versus the potentially disruptive effect of the curtailment on its operations were not always taken into consideration or did not present a compelling case to the customer. Advanced technologies, such as the VPower™ system used by ConEdison Solutions, schedule active reductions in electricity use based on the economic opportunity to the customer. The opportunity for savings can arise from one or more sources. For example, energy markets administered by the regional grid operator allow an organization to earn the same revenue

for reducing its consumption of electricity that a generator earns for increasing its production of electricity. The grid operator's ancillary services markets and capacity market offer opportunities for the customer to earn revenue, by committing to reduce consumption on fairly short notice, or by helping to preserve stability on the grid.

Traditionally, electricity generators have provided these services, but recent changes in regulations have enabled electricity customers to provide these same services and to be paid on the same terms as a generator. For that reason, ConEdison Solutions refers to this package of services as "Virtual Generation."

Virtual Generation serves as an effective hedge against volatility in electricity prices by enabling an organization to provide resources to the grid and earn revenues on the same terms as a generator – offsetting major components of the overall cost of electricity.

Furthermore, the ability to provide these services utilizing automation means that the customer is able to react quickly and effectively to volatility in electricity prices while still having input on any change to operations. With that capability, an organization is well-equipped to purchase its supply of electricity. Revenues earned from market participation through active reductions are supplemented by savings on retail electricity supply. The same capability to reduce consumption in response to price not only enables the customer to earn revenues from the grid operator's wholesale markets, but also enables the customer to save money on its retail electricity supply. Furthermore, these capabilities make it feasible for a customer to purchase electricity supply at prices that reflect consumption patterns reducing the retail electricity supplier's risk, thereby enabling the supplier to sell the customer power at a lower overall price.

Virtual Generation Technology

Becoming a Virtual Generator requires sophisticated energy business expertise, including pricing forecasts, rapid resource optimization, measurement and verification, and performance reporting.



Market and savings opportunities will vary with a customer's normal electricity consumption, output from on-site intermittent renewable generation (such as solar), local weather, and prices in the local wholesale markets. Therefore, all of these variables must first be forecasted accurately, and the implications of the forecasts must all be understood and integrated.

A customer's resources must be optimized to take advantage of forecasted conditions. For example, an office building may reduce electricity consumption by adjusting its temperature settings for short durations. At the same time, the customer has priorities and constraints that must be served – such as the need to keep temperatures within the building comfortable for tenants. Fortunately, forecasted hourly temperatures, the amount of direct sunlight, and the thermodynamics of the building itself all affect the tenants' comfort – not just the setting of the thermostat. Optimization takes all of these factors into account, and includes actions such as pre-cooling the building earlier in the day so that temperatures stay in a comfortable range for the time period when consumption is reduced to take advantage of high hourly electricity prices.

Finally, the customer's business-as-usual consumption (how much electricity would have been used if the customer had taken no action to reduce its electricity use) must be calculated. That business-as-usual number is the baseline used to calculate how much the customer reduced its consumption in practice. The difference between the business-as-usual consumption and the actual consumption is the basis for the revenues earned from the wholesale markets and is also the basis for measuring cost savings.

Needless to say, all of this work is performed while the various conditions of weather, prices, customer needs, and other variables are changing. As a result, taking full advantage of market and savings opportunities depends on two key technological advances: technology that integrates

these forecasts, optimization strategies, and performance measurements into a set of recommended actions for the organization to take; and technology that implements these actions through automation, once the customer has accepted the recommendations. ConEdison Solutions uses the VPower™ system to perform this work.

Tailored Turnkey Solutions

Each customer has unique business priorities and constraints, and each facility has different energy-consuming, energy-producing, and energy-storing resources. As a result, there is no one-size-fits-all solution.

Implementing a turnkey solution involves a series of steps that cater to the business and operational parameters of the customer. These steps include a preliminary estimate of the customer's capability to earn revenue and to realize savings, based on the facility's resources and its priorities and constraints; a site walk-through and analysis of energy systems to refine the estimate of the economic opportunities, a formal proposal and project plan; establishment of communications between the optimization system and the customer's facility; and enrollment of the customer into the grid operator's markets.

Once this work is completed, an organization is ready to take advantage of economic opportunities, and actively manage and control its energy spend, even in a volatile electricity market.

