5 Simple Steps to Making Demand Response and the Smart Grid Work for You
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Demand Response (DR) programs allow retailers to yield back unused power to the utilities during power-grid emergencies – and profit from it. Learn how you can make Demand Response and the Smart Grid work for you in just 5 simple steps.
Overview

As the electricity grid becomes increasingly stressed, utility companies are eager for customers to cut back on energy consumption during critical periods – and they are willing to pay retailers and chain location operators to do so.

Moreover, with recent expansion of programs such as Demand Response, Capacity Bidding and Ancillary Services, load management has become an important way for retailers and chain operators to participate in the Smart Grid today.

So, how do you get involved and benefit from these exciting opportunities while protecting the shopping experience? Read on to learn 5 simple steps you can take to make Demand Response and the Smart Grid work for you.
Chapter 1: Take a Hands-Off Approach

Demand Response (DR) programs are becoming increasingly prevalent across the country as utilities deal with growing electricity demand, limited power generation options and an aging power grid. But you can’t just call your power utility in the middle of a heat wave and ask to have your power cut. Moreover, relying on manual methods of DR – such as asking store managers to flip breaker switches or blindly using your EMS to raise thermostats across all units, regardless of conditions – can risk negatively affecting the customer experience and cash register if you leave customers sweating or shopping in the dark.

Take a “hands-off” approach by implementing an Energy Management System (EMS) that is linked to your utilities through a new breed of automated, no-touch, demand-response technologies – also called Intelligent Load Management (ILM).
But take note: To tap into real DR savings, your EMS with ILM must be connected to the utilities with bidirectional real-time data feeds.

Sound complex? It’s not, if you leverage the right technology solution. A case in point, in the recent July 2010 heat wave, thousands of chain retail locations collaborated through the use of their EMS and Siemens’ Intelligent Load Management (ILM) System to programmatically shed electric load by incrementally reducing demand in a way that did not affect customer comfort. Aggregate load was reduced by 30 percent. As a result, the ILM Program was able to “virtually generate” megawatts of power and return it unused to the grid, while also preventing the least-efficient power plants from coming online to generate supplemental power.
Chapter 2: ‘First Do No Harm’ – Protect the Shopping Experience

Participating in Demand Response does not have to compromise customers’ in-store experience and should not be engaged in blind, ‘one-size-fits-all’ approach. Instead, the load reduction at each location should take specific real-time store conditions into account for maximum effectiveness. Chain location operators can determine how much power they are willing to shed during a Demand Response event by utilizing Siemens’ ILM technology and establishing business rules for set-points and lighting levels at locations. Individual locations can automatically opt out of a DR event if equipment conditions or store temperatures can’t support a load shed at a particular moment.

With Siemens’ ILM technology, you maintain control of your retail environments to ensure optimal shopping experiences for your customers. This was particularly evident during the 2010 heat wave. While thousands of chain
locations participated in load reduction programs, Siemens Intelligent Load Management next-generation Smart Grid technology considered building occupancy, air conditioning equipment conditions, and environmental factors to maximize energy curtailment while ensuring that customer comfort standards were maintained throughout multiple events (over 50 in one season!). The entire ILM process – from initiating a demand-response event to dynamically adjusting set-points and in-store lighting – was completely automated based on customer-defined parameters and specific in-store conditions.

Strategies such as pre-cooling the space prior to an event, cycling individual roof-top HVAC units, and temporarily disabling non-essential equipment all help retailers to deliver the maximum load reduction with minimum consequence. This ensures a comfortable – and profitable – shopping environment.
Chapter 3: 
Don’t Go It Alone

With ILM, dozens or hundreds of locations within each ISO or utility service area can be aggregated into a single “virtual generation plant.”

In many DR programs, each site has its own minimum commitment that it plans to shed when called upon by the utility. Retailers must either bid very conservatively (which decreases their payments from utilities) or more aggressively (which increases payments but risks compromising the shopping experience if site conditions cannot support shedding power).

With ILM, retailers can leverage strength in numbers – they are part of a diversified portfolio of locations. And similar to a financial portfolio, an ILM portfolio maximizes DR returns by spreading risk among hundreds of locations, across different retailers, and types of businesses (restaurant vs. health club vs. arts & crafts retailer). The ILM system automatically sheds
as much load as possible from each location, while considering the parameters of each site – e.g. store occupancy, lighting levels, HVAC performance, etc. – and continually altering strategies in real time.

To see the collective power of aggregated automated load management, take a look at this example from a Texas electrical grid emergency with 100 Siemens Stores participating.

Texas Grid Emergency
100 Siemens Stores Participating

- 21% load reduction
- 3.5 hours
- no material negative consequences
Aggregated, Automated Load Management

The graphs on the next few pages show the effect of ILM during a recent grid emergency event in Texas involving more than 100 retail locations. Siemens innovative load aggregation strategy delivered kW reductions exceeding 21% with no negative customer impact.

The first graph shows the aggregate demand in kW for all stores, the day prior and day of the grid event. In the first graph, the blue line shows the aggregate baseline demand from the prior day, while the green line shows load reduction effect of more than 100 stores participating ILM program. This is the ‘utility view’ – the power ILM returns back to the grid across a portfolio of chain locations to alleviate stress and avoid blackouts.
Overall load shed – what the utility sees.

ILM load shed creating virtual power for the utility.
The next graph shows the disaggregated data for each store participating in the event, normalized as a percentage to account for differences in store size/kW. While the utility view shown above is very smooth and predictable, this graph tells a much more dynamic story at the individual store level. During a grid event, the ILM aggregation engine continually monitors each location, and sheds as much load possible while adhering to the pre-configured business rules established by each retailer. Minimally occupied stores with properly functioning HVAC equipment can contribute a large amount of load, while heavily occupied stores with failing HVAC equipment might not give up any load at all. The ILM aggregation engine automatically balances the portfolio of stores to deliver the maximum power back to the grid at minimum risk to the shopping experience.
“Behind the scenes” – performance of each individual site.
With ILM technology from Siemens, you maintain control of your retail environments to ensure optimal shopping experiences for your customers.
By implementing EMS technology, retailers not only help “save the grid” and improve their bottom lines, but also dramatically reduce carbon their footprints. During a peak power event, the electric grid is at risk for blackouts, but many people don’t realize that this is also the time when the oldest, dirtiest power plants come back online to generate the extra power required. By shedding load through an ILM Program, retailers get cash for the power they don’t consume, as they simultaneously make the environment a little cleaner.

In addition to periodic peak load management, Siemens EMS also delivers compelling energy savings 365 days a year. Siemens’ customers have seen energy savings that range from 15 to 30 percent, resulting in millions of dollars of cost avoidance. Further, the energy savings drives a significant positive environmental benefit. For example, by implementing the Site Controls
system, leading arts-and-crafts retailer Michaels Stores, Inc. cut energy usage by 137 million kWh annually. This reduction has the achieved an annual environmental impact of:

- Reducing CO2 emissions by 192 million lbs.
- Removing 17,400 cars from the road for 1 year
- Powering over 12,900 households for 1 year

Aside from the greater good and bottom line savings of EMS and ILM technology, improving public perception of environmental friendliness is a key benefit of going green. To direct attention toward your energy-saving efforts and potentially capture more wallet-share, you can prepare customer messaging, including signage and PR, for the event to promote participation and Corporate Social Responsibility. Some retailers even make in-store PA Announcements during events, which are sometimes even met with applause from happy customers.
Ready to make Demand Response and the Smart Grid work for you? Turn to the experts at Siemens. Because of our automated technology and relationships with utilities, in many jurisdictions we can deliver higher payments than other DR aggregators. Moreover, as the leading provider of enterprise-wide energy management and facilities intelligence solutions, Siemens has a long history of cutting energy management costs and improving the customer experience.

The Site Controls solution is an above-site energy management platform that monitors and controls major energy-consuming devices such as HVAC, lighting, refrigeration, signage and more, to drive down energy and maintenance costs. Our energy management solution incorporates energy efficiency, corporate social responsibility, comfort and controls, operational intelligence and demand response services.
By providing persistent, real-time access, visibility and control over thousands of assets and sites, Siemens helps chain retailers and branch banks create a compelling customer experience, while simultaneously saving money, reducing emissions and improving business efficiency. Learn more at www.usa.siemens.com/rcs.