Utility Deregulation and The Role of Standby Generators

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Abstract

The electric utility industry around the world is on the brink of deregulation. Virtually everyone involved in this industry agrees that deregulation will have a dramatic and far reaching impact on both utilities and their customers during the coming years. As deregulation unfolds, electricity will become a commodity product and the lowest-cost power providers will dominate the market. Supplying electric power is an extremely capital intensive business, so a utility's survival will depend on using assets more efficiently as rates are forced down by competition. Thus, utilities are exploring partnerships with their larger customers who own standby (emergency) generators to provide less costly solutions for meeting system-wide peak demands. Without the protection of regulated monopolies, utilities simply cannot afford to let 15% of their total resource capacity sit idle 95% of the time (U.S. utilities currently have more than $50 billion invested in these seldom-used "peaking" resources).

Deregulation will force utilities to offer innovative electric services and find creative solutions to reduce the cost of electricity, which may have been overlooked in the past or were cost-prohibitive with previously available technologies. Consequently, substantial incentives are now available to customers for reducing power consumption during periods of system-wide peak demand. Various utility strategies attempt to achieve this goal including interruptible rates, "peak sharing" programs, real-time pricing, time-of-use pricing, coincident demand charges, etc. These new rate structures will result in electricity being viewed as simply another component in the manufacturing or business operations process. As such, electricity will be subject to the same "make versus buy" decision as any other item required to conduct business operations. The bottom line for companies who own expensive standby power equipment is that self-generation becomes attractive whenever the cost to purchase power exceeds the overall cost to generate equivalent power.

Although some of these new "peak reduction" rate structures are experimental and confined to specific regions of the country, interruptible rates are broadly available and they can often result in electricity cost savings from 30% to 50%. Based on these rate incentives, upgrades to standby generators that eliminate any inconvenience caused by the power interruption will typically pay for themselves in less than one year. In some regions of the country, an entire standby generator package may pay for itself in less than three years.

Electric Utility Deregulation and Industry Transformation

Deregulation will create dramatic and far-reaching changes in the electric utility industry throughout the world during the coming years. One aspect of those changes will be a migration toward distributed utility resources rather than the central-station power plant paradigm of today. In fact, many industry experts believe that distributed resources will impact large central-station power plants during the coming decade in the same way that microcomputers invaded main-frame computer markets during the last decade.

> I think we're just beginning to recognize how profoundly the industry's generation and delivery systems will be transformed in the coming years. I see this playing out in much the same way the computer

> industry has evolved. Large mainframe computers have given way to small, geographically dispersed desktop and laptop machines that are interconnected into fully integrated, extremely flexible networks. In our industry, central-station plants will continue to play an important role, of course. But we're increasingly going to need smaller, cleaner, widely distributed generators — combustion turbines, fuel cells, wind turbines, photovoltaic installations — all supported by energy storage technologies.[1]

Considering the tremendous size and complexity of the electric utility industry, these changes are not likely to happen quickly. However, the impact of competitive market forces into what has traditionally been a monopolistic and regulated industry will be felt by literally every single person who uses electricity.

> Once in a great while, the confluence of technical change and external factors causes something extraordinary — a revolution of sorts, a technologically driven discontinuity. People usually are not aware of being in such a transition, but when it's over, everything is changed... Advances in technology now (or soon to be) available will allow us to change for the first time in over a century the basic ways we generate, store, transmit, and use electricity, promoting higher efficiencies, expanded capabilities, and lower costs.[2]

The changes that will take place are probably not all that dissimilar to changes that have taken place in other deregulated industries, such as the telecommunications, airlines, and natural gas industries.

> As we have seen in the telecommunications and natural gas industries, the framework of the industry will dramatically change, but with that change will emerge a number of new competitors, each developing their own niches to create value and service for existing and future players in the marketplace... In the end, we will see a more flexible, efficient, and reliable marketplace in which the driving forces will be competition and market forces rather than the regulatory forces of command and control.[3]

Distributed Generation and Peak Sharing

Demand-Side Management (DSM) is one of the most important strategies that utilities are using to stretch their existing resources further. Major goals of demand-side management include:

- Improved operating efficiencies
- Reduced capital requirements
- Enhanced customer service

One of the problems with traditional energy conservation DSM programs (e.g., high efficiency lighting, motors, air-conditioning, etc.) is that they do not specifically target the problem of peak system demand without also reducing the base load demand (and consequently reducing the utility's main source of revenue throughout the year).

> Electricity costs more to produce and deliver during peak periods. All generation, including less efficient and more expensive-to-operate units, have to be operated at that time. Electric losses are higher. As a result the cost to produce and deliver a kWhr during peak system hour can be three or even five times the cost to produce and deliver a kWhr off-peak. One way of both recovering that higher cost, and of

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1 Balzhiser, Richard E., President EPRI, *EPRI Perspectives on the Future*, www.epri.com, 1995.

2 Culler, Floyd L., President Emeritus of EPRI, *EPRI Perspectives on the Future*, www.epri.com, 1995.

3 Rice, Kenneth D., Enron Capital & Trade Resources, "Electric Power Marketers: What is Their Role in the Evolution of the Electric Utility Industry?" *Cambridge Energy Forum*, pp. 107, 108.

> providing a clear, consistent incentive to customers to cut back on usage during peak, is to charge a higher price during peak periods.[4]

"Peak sharing" programs between utilities and their customers who own standby generators can readily achieve DSM goals through reliable peak demand reduction, which also creates lasting partnerships between utilities and their large commercial/industrial customers! Peak sharing provides utilities with a cost-effective solution to find new sources of peak power without making huge, financially crippling capital investments in additional power plants, substations, and power lines. A portion of the utility's savings from peak sharing programs are passed along to participating customers, creating extremely valuable long-term partnerships to ensure that both sides save and both sides win!

> By running the generators as little as 50 to 200 hours per year, the customer earns annual incentives worth hundreds of thousands of dollars. Savings of more than $1 million per year are not uncommon... Besides cutting costs, peak sharing helps utilities satisfy system peaks, improve load factor, and strengthen the grid by stabilizing voltage... This is especially attractive for companies that have critical power needs, since generators installed for peak sharing can double as standby units during emergency outages. Conversely, peak sharing can be used to turn otherwise idle standby generator sets into revenue producing assets.[5]

Besides the significant customer retention benefits and economic value of peak sharing programs for utilities, distributed generation has a number of other intangible benefits as well.

> Utility investments in new generation, transmission, or distribution typically have large scopes and commit the utility to a specific course of action for many years. These large, long-term commitments were not a problem in the past, as costs and rates steadily fell, load growth was high, and friendly regulation guaranteed utilities a fair return. In today's utility business environment, however, it is likely that the long-range forecasts will not be accurate, and management will be forced to adjust the investment plans. In these situations, it is very useful to have downstream flexibility so that investments can be changed in response to future events... Many distributed generation technologies feature two related characteristics that can provide substantial managerial flexibility. First, some distributed technologies have short lead times that allow utilities to react quickly to changing conditions. Second, distributed generation technologies can be modular, permitting utilities to invest in only as much capacity as needed.[6]

> In general, the benefits of distributed generation are driven by its size flexibility and its siting advantage over large central power stations. The ability to site small-scale generation close to the customer holds potential for improving the reliability of delivered service and promises new options for managing important industrial and commercial clients through tailored energy services. Also, locating small resources near or on an existing distribution substation could help defer costly transmission and distribution (T&D) upgrades; and local generation could improve the efficiency, operation, and management of the distribution system by facilitating load shifting and providing voltage and power quality support.[7]

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[4] Willis, H. Lee and Rackliffe, Gary B., *Introduction to Integrated Resource T&D Planning*, The Automated Distribution Division of ABB Power T&D Company, Inc., Cary, NC, February 1995, p. 147.

[5] Unes, Mike, Caterpillar Inc., "Reducing Power Costs Through Peak Sharing: Utilities and customers form win-win partnerships to cut peak power demand and save millions of dollars", *Foundry Management & Technology*, June 1994, pp. 40, 41.

[6] Chapel, Stephen, EPRI Power Delivery Group, "EPRI Investment Strategies Project Volume 1: Value of Flexibility & Modularity of Distributed Generation," *EPRI Report Summary TR-104171*, October, 1994.

[7] Rastler, Daniel, EPRI Generation and Storage Division, "Distributed Generation," *EPRI Journal*, April/May 1992, pp. 28-30.

Capitalizing on Deregulation Opportunities with Standby Gensets

It is very important to note that a formal "peak sharing" program is not necessary for owners of standby generators to take advantage of utility-sponsored DSM efforts. Electric bills can also be slashed by using standby generators in conjunction with various other rate structures including interruptible rates, real-time pricing, time-of-use pricing, and coincident demand charges. Interruptible rates are now available nearly everywhere in the country, while the other rate structures are more experimental and confined to specific regions. Depending on location, interruptible rates often result in savings of 30% to 50% off the total electric bill for many large customers. The bottom line for companies who own expensive standby power equipment is that self-generation becomes attractive whenever the cost to purchase power exceeds the overall cost to generate equivalent power.

As far as this type of customer is concerned, peak sharing, real-time pricing, time-of-use pricing, coincident demand charges, and interruptible rates are all just different ways for utilities to promote load curtailment, similar to traditional peak shaving. However, peak shaving to reduce monthly demand charges is not desirable from the utility perspective because self-generation during off-peak hours results in under-utilization of utility resources and cost-shifting to other customers. In contrast, the utility directly initiates these new forms of load curtailment only when the utility's cost of producing and delivering electricity is very high (rather than having customers use self-generation based strictly on peak demands at their own facilities).

To make standby gensets useful in these rate reduction applications, they usually require upgrades to automate genset operation and to make the transfer of power from the utility to the genset and then back again completely transparent to the end-user of electricity. This means upgrading to a paralleling system that will "softly" load and unload the genset in response to volatile electric prices, which may change as often as every half hour. An added benefit to the paralleling upgrades is greatly improved performance and reliability of the emergency power system (because parallel operation allows standby gensets to be tested **simply and regularly** under real-life load conditions with "blipless" power transfers that are completely unnoticed by electricity consumers).

> Regular testing of an emergency power system will uncover problems that could cause a malfunction during an actual power failure... Field surveys have proven that an automatic emergency power system should be tested under conditions simulating a normal utility source failure. Experience shows that the rate of discovery of potential problems, when a system is tested automatically with the emergency generating equipment under load for at least one-half hour, is almost twice the rate when a system is tested by manually starting the generating equipment and letting it run unloaded.[8]

In summary, deregulation will create a wide array of new business opportunities for those with the vision to respond in a timely manner. One such opportunity that provides a win-win solution for utilities and their customers who own standby gensets is "peak sharing". The benefits of peak sharing for both sides extend far beyond the highly attractive economics of this unique peaking power solution — from creating long-term partnerships to providing managerial flexibility to improving the reliability of emergency power systems.

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[8] Daugherty, Herbert, "Automatic Transfer Switches," *On-Site Generation: A Reference Book - Second Edition*, Electrical Generating Systems Association (EGSA), Coral Springs, FL, 1993, p. 134.