

## **Demand Response: Should There Be a Different Strategic Direction for a Vertically Integrated Electric Utility?**

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The Energy Policy Act of 2005 set in motion a flurry of demand response (DR) activity at both the State and Federal level. This effort is understandable given the political problems with high prices that the competitive organized markets (COM) are experiencing and major blackouts that certain areas of the country have experienced this decade. DR is believed to be part of the solution for both problems. Vertically integrated electric utilities (VIEUs) with adequate generation reserve margins are not experiencing these problems. However DR is still valuable for VIEUs but they should have different strategic goals and objectives.

To understand the difference between the VIEUs' and the COM's strategic goals, it is essential to first understand DR's role in reliability. Generation-based transmission outages are endemic to any market model if resource adequacy (RA) reserve margins fall below critical levels. RA is also called planning reserves. It requires load serving entities (LSE) to maintain generation resource reserves above their projected peak loads. RA reserves are usually between 10 percent to 20 percent. However, RA reserves don't prevent outages, they just reduce their likelihood. When a transmission operator does not have adequate generation supply in real time to meet demand, under-frequency or under-voltage conditions will occur. The transmission operators must have established plans for automatic load shedding if these conditions occur and implement load shedding in steps to minimize further uncontrolled events. They must also have plans for operator-controlled manual load shedding to mitigate violations of system operating limits or interconnection reliability operating limits.

To prevent a total collapse of the system during the 2000-2001 California energy crisis, rotating blackouts were used. The cause of the energy crisis in California is multi-faceted but one of the issues that became apparent is that California needs additional generation and transmission capacity to meet peak demand levels that continue to grow at a rapid pace. Southern Connecticut and areas in California are specific examples where there is inadequate peak generation capacity but it could just as easily happen in a VIEU's transmission footprint. Demand response should be treated differently by transmission operators and Regulators in these areas. Because DR will be reducing the likelihood of highly probable rotating blackouts, the value of loss load (VLL) should also be incorporated in the DR curtailment incentive or DR rates, in addition to the cost of a new peaking turbine. When the transmission operator curtails all customers in a geographic area to maintain the stability of the system, there is a real societal cost incurred by the local population. Incentive-based DR programs or super critical peak pricing rates should include these rotating blackout costs. This also has the ability to reduce the societal costs associated with rotating blackouts because customers that choose to reduce peak energy use can proactively plan to manage their reduced energy use rather than a geographic area taking its turn in a rotation cycle.

Almost all traditional US VIEUs have not experienced a generation-based transmission outage and are extremely unlikely to do so in the future. As long as they continue to ensure generation is built in their control areas to maintain adequate RA margins and transmission is built to load pockets, these types of DR programs should not be included as one of their primary strategic goals. DR in geographic areas subject to rotating blackouts will be covered in a future IA article.

Any truly functioning market incorporates dynamic supply and demand forces. A frequent criticism of current wholesale electric market design is that the demand-side of the market is not active; thereby creating the potential for supplier market power. Enabling demand-side responses as well as supply-side responses will increase the COM's economic efficiency. DR can play an important role in mitigating the potential for generators to exert market power in wholesale electric markets. In the COM, during periods of high demand and inadequate supply, market-clearing prices can escalate to high levels as more expensive-to-operate generation is dispatched. Without price-response mechanisms to lower demand as market-clearing prices increase, the potential for supplier market power abuse (such as capacity withholding) is heightened. Price responsive demand mitigates market power potential because these reductions increase suppliers' risk of being priced out of the market. Customers who lower their consumption increase the number of suppliers in the market, reducing concentration and making collusion more difficult just when competitive concerns are the most severe. Sufficient amounts of price-responsive demand may reduce the need to use price caps and other market mechanisms such as installed capacity markets. As retail prices have soared in the COM in recent years, all stakeholders are concentrating their efforts to make DR work.

But high prices in the wholesale electric market are not a significant problem for most VIEUs. VIEUs are required by their State Regulators to secure generation resources to meet their retail loads plus a RA reserve margin. Their prices are based on the average for their generation fleet's cost and they do not have their retail prices based on the marginal generation unit in the wholesale electric spot market. They use the wholesale electric market for economy purchases and sales and while these functions can lower fuel adjustment costs they are not the key driver to a VIEU's retail prices.

The VIEU's primary DR strategic goals should be:

- Provide an alternative to a peaking generation resource for an integrated resource planning process (IRP) or new supply planning process.
- Enhance the value of electricity to improve competitiveness with other sources of energy.
- Improve competitiveness of the VIEUs industrial sector.

Most VIEUs are presently undergoing an IRP or new supply planning process. State regulators should include DR as an alternative to a peaking resource during these planning processes. If DR is a lower cost option than the supply resource, it should be implemented. Both DR and a new peaking resource should use the wholesale market spot and forward prices as the means of evaluating these options. Linking wholesale markets to the IRP process is critical to ensure that future generation and transmission expenditures are prudently spent. Many VIEUs have no organized wholesale electric markets and all trades are bilateral. As a result, these markets at times are highly illiquid with almost no price transparency, especially in capacity and

ancillary service products. This is especially true for demand response optionality. However, all of these utilities have economic dispatch and wholesale electric trading functions that continuously utilize the wholesale electric markets to find purchases that are less than their marginal unit or enter into sales if they have excess resources that clear the market prices. This provides a means of measuring DR's benefits, but standardized terms and conditions must evolve so that the products are tradable within and among markets.

The VIEU should be most concerned about increasing the value of electricity, especially where it competes directly with fossil fuels. This is done by using DR to avoid the high electric costs during peak hours and thus provide lower unit cost electricity. Water and space heating are market segments that directly compete with fossil fuels. There are a number of DR program components that will improve the competitiveness of these two market segments.

The VIEU can also improve the competitiveness of their industrial sector by providing dynamic pricing products that can allow their customers to shift production from high cost to low cost periods. Many VIEUs presently provide real time pricing (RTP) rates that have started this strategic initiative. It has allowed industrial customers the opportunity to produce a unit of production at lower costs. However, the COM is spurring additional development of this pricing structure's benefits. Many COM state Regulators are forcing all large customers that choose a default service based on wholesale electric market spot energy, capacity and ancillary services prices. Many new retail services suppliers such as the publicly traded company EnerNOC are now providing comprehensive technology and consulting services along with centralized customer energy and demand monitoring support to these large customers. As this COM market best practice continues to evolve, VIEUs can implement improved dynamic pricing and encourage these new service providers to bring the same economic benefits to their customers.

In the figure below, I have summarized the different primary goals of VIEUs and the COM stakeholders. The COM has a significant amount at stake as DR is believe to be at the center of reducing supplier market power and improving the efficiency of their markets. In the short run if DR fails for a VIEU they will have a slightly larger generation supply portfolio with a higher percentage of peaking generating plants in it. In addition their price competitiveness with will gradually decrease over time.

## **Demand Response's Primary Goals**

### **VIEU Bilateral Market**

- **Provide an alternative to a peaking generation resource for an IRP or New Supply planning process.**
- **Enhance the value of electricity to improve competitiveness with other sources of energy.**
- **Improve competitiveness of the VIEUs industrial sector.**

### **Competitive Organized Markets**

- **Improve market performance by reducing potential for supplier market power.**
- **Enable demand-side responses as well as supply-side responses to increase economic efficiency in electricity markets and improve system reliability.**