

**BETTER ELECTRICITY PRICING LOGIC:
ENABLING *FULL-ON* CUSTOMER RESPONSE**

Dr. Eric C. Woychik
Comverge, Inc.
Email: ewoychik@comverge.com

January 2009

Introduction

Residential and commercial direct-load-control (DLC), automated-demand-response (Auto-DR), and price-response are many times narrowly applied, which limits the multiple benefits that otherwise are ascribed and harvested. Optimization of the multiple benefits of DR and of customer response has not been systematically pursued. Traditional electric tariff design has focused on revenue stability and uniformity. These are the usual goals of regulated utilities. Still not fully defined are the abilities of customers to participate in DLC and Auto-DR as well as vary their loads in response to market signals. We seem stuck in the past as viable options to deliver DR options and convey price signals to customers are lacking. This paper recommends that customer response be unbundled more fully than has generally been discussed. Customer response must be coupled with the maximum value available in organized markets. The recent Federal Energy Regulatory Commission Order 719 states with emphasis that comparability between demand and supply-side resource is essential. DLC, Auto-DR, and customer response, by individuals and through facilitation by aggregators, are obviously central to this. Wholesale markets and retail entities may offer many options. This suggests a menu of options and that resolution of the retail pricing issues will be somewhat complicated.

Efforts to design retail customer price responsive tariffs for use in organized markets have largely been miss-starts and failures. Three problems with most pricing designs are: (1) customers are not motivated to respond -- typically the price-differential is too small; (2) there is perceived subsidy if larger peak/off-peak price-differentials are

offered, particularly when energy and capacity are bundled, and (3) the default tariff may be preferable if it reduces customer risk and forestalls customer education about prices and options. Hourly market-based tariffs for pricing usually focus on energy, leaving capacity to be ignored, clearly a sub-optimal result. The benefits of customer response to a set of market options -- the optionality of DLC, Auto-DR, and price response – suggest much greater value is available than from mere response to the energy market. Yet, customer response is critical to gain the maximum benefits of real-time-pricing (RTP). This logic points to the need for an option-based pricing package that enables customers and aggregators to choose from a set of viable options.

This paper outlines objectives, offers a brief a map of customer response options, suggests pricing for options, and presents implications. The conclusion suggests that the full set of customer response options should be made available, focusing on both energy and capacity value to achieve better customer pricing.

Objectives of Customer Response

A set of objectives for the design of price-based customer response options are stated up front:

- Customer self-selection of tariff and program options
- Enable optimal customer use of its load in the market
- Facilitate discretionary customer response to match market prices
- Fully unbundle all loads and enable each to be offered on a discretionary basis in response to matching market prices
- Capacity -- option contract value – can be sold by customers as Demand Response (DR)
- A customers menu of dispatchable and voluntary price response options
- Aggregators provide hassle-free dispatchable voluntary price options based on pay-for-performance
- Subsidy is to be avoided if at all possible.

A Map of Residential and Commercial Customer Response Options

The broader map of customer response options can be offered to allow customers to fully play all loads into the market place, including the following:

- Voluntary price response based on hourly energy values (e.g., Day-Ahead spot prices), with internet, pager, and public broadcasting notification of high price events
- Auto-DR, such as through pre-set programming of Smart Thermostats and ZIGBEE enabled appliance controls
- DR based on direct-load-control that is fully dispatchable when available
- A full-curtailment option – all load -- with appropriate energy and capacity benefits, which may be triggered by a strike-price or emergency
- Matching of customer response options to all major market opportunities for capacity and energy.

One conclusion from this set of options and from recent benefit-cost analysis of dispatchable DR – option contracts – is that there is substantially greater value in optionality, as well as contract duration, especially where energy markets are volatile.¹ More simply, with a customer response DR resource that can be held in reserve and used for maximum benefit for a broader set of market services the value is considerably greater than where a DR resource is used for a limited purpose.

¹ See, Woychik, E., *Optimizing Demand Response*, Public Utilities Fortnightly May 2008; Direct Testimony Of Dr. Eric C. Woychik On Third Party Demand Response Cost-Effectiveness, In California Public Utilities Commission, Application Nos. 08-06-001, 08-06-002, 08-06-003, November 24, 2008, On Behalf of the Comverge, Inc.

How to Enable *Full-on* Customer Response and Appropriate Pricing – Energy versus Capacity Prices?

In the light of this approach to enable *full-on* customer response, the questions seem to be, in practical terms, how to enable this set of options to be available and how should these options be priced?

To make these options available, one KISS (keep it simple stupid) concept is to avoid mixing energy and capacity. In simple terms this suggests that options be provided for customers to alter their energy costs and separately offer options to reduce their capacity costs. But while this approach seems simple, unbundling of customer response needs to be reconciled with the electricity market and its options. Fortunately, the energy and capacity products are largely differentiated in wholesale electricity markets.

Another often used concept is *follow-the-money*, which suggests tailoring residential and commercial customer response to enable pricing of existing wholesale and retail market opportunities, albeit some of these opportunities still remain nascent. A large set of wholesale and retail opportunities that should be unbundled, priced, and available for customer response are as follows:

- Response to high wholesale energy prices; reverse increasing prices that otherwise proceed further up the vertical supply curve
- Response to reduce congestion prices, which during super-peak periods can exhibit the same behavior as high electrical energy prices
- Response to provide *Out-of-Market* (OOM) energy
- Dispatchable load as local resource adequacy – planning reserve margin
- Dispatchable load as operating reserves (e.g., non-spinning reserve)
- Dispatchable load to displace Reliability-Must-Run (RMR) resources (e.g., to increase voltage support)
- Dispatchable load to address Stage 1, 2, or 3 emergencies
- Dispatchable load to address distribution constraints²

² Distribution costs that can be avoided include variable and fixed costs, the latter which may include reconductoring, transformer down-sizing, and reduced distribution infrastructure.

- Dispatchable load to integrate *must-take* renewable resources

This list suggests that that customers should have at least six dispatchable DR options and three energy market options. The dispatchable options can be provided under a multi-part option contract. Customer responses to energy markets generally require interval metering, and may involve automation of strike-price triggers.

Implications of *Full-On* Customer Response – Energy and Option Contract Value

From this more complete unbundling of customer responses for electricity markets a set of implications seem to obviously follow:

- Use of a single tariff for any major customer segment to provide dynamic prices for customer response is at best limiting, but may be used for customer response to energy prices
- Customer response to capacity or option-value products should be expanded
- Customer response to enable full participation of loads requires a menu approach
- Wholesale prices for specific products should be directly passed on to customers who provide comparable dispatchable and energy related services
- There are a host of potential customer response services that can be offered to wholesale and retail markets based on well-defined, comparable pricing
- Pricing of hourly energy should be placed on a comparable basis with default (non-hourly) rates in order to enable customer response in energy markets
- If used, multi-part tariffs to integrate energy and capacity components of value to customers need to be tied specifically to the markets they are used for in order to avoid perceived subsidy

- Use of Day-Ahead and Real-Time energy pricing should be accompanied by dispatchable response in order to maximize the value to customers

When customer response is truly enabled without the traditional constraints, customers will be able to provide very substantial energy market and capacity market value, to enable optimization and much greater value. Certainly the full set of customer options should to be made available and both energy and capacity value need to be fully unbundled in order to achieve proper customer pricing.

Conclusion

The next stage is to enable the full set of customer response options -- DLC, Auto-DR, and price-response -- to be available in order to enable integration of both energy and capacity value. The standard practice should be to offer customers DLC, Auto-DR, and viable price response options. This is the future that will leverage meaningful option-based DR use for residential and commercial customers.