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The Business Case for Demand Response

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The recent rise in energy costs, concerns about availability of electric supplies and the reliability of the electric transmission and distribution grid have once again focused customers and planners on alternative energy solutions, like demand response (DR), as viable options in the resource portfolio. The idea of encouraging customers to move electric load from peak to off peak periods, or conserve or use alternative supplies during peak periods is not new. The electric industry has been conducting programs of this nature for decades. While today's trends, and regulatory and customer interest are driving an increasing need for demand response, deregulation and a fragmented market have made the process more complex. With the proliferation of demand response programs at the state and regional levels, and the inclusion of language supporting demand response in the recently passed federal energy legislation, various levels of government have instituted demand response programs or provided incentives for the creation of such programs.



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However only a limited number of customers and suppliers have taken advantage of demand response opportunities because:

- An evolving regulatory framework has increased the number of stakeholders involved in a DR program resulting in:
 - The need for additional benefits and a more efficient process to successfully implement DR options
 - Many inconsistent protocols for obtaining and sharing information increasing the cost of DR efforts
 - Market confusion and barriers
- A patchwork approach for determining and providing benefits has increased risks and volatility of benefits
- The lack of an acceptable process to all stakeholders for valuing and accessing all the benefits of DR (e.g., capacity, transmission, environmental and distribution) has resulted in longer payback periods
- While demand response, resource adequacy and infrastructure planning are interrelated, they are often treated independently reducing the potential benefits
- There is a lack of market focus, including market research, that has led to a supply-oriented solutions rather than solutions based on customer needs

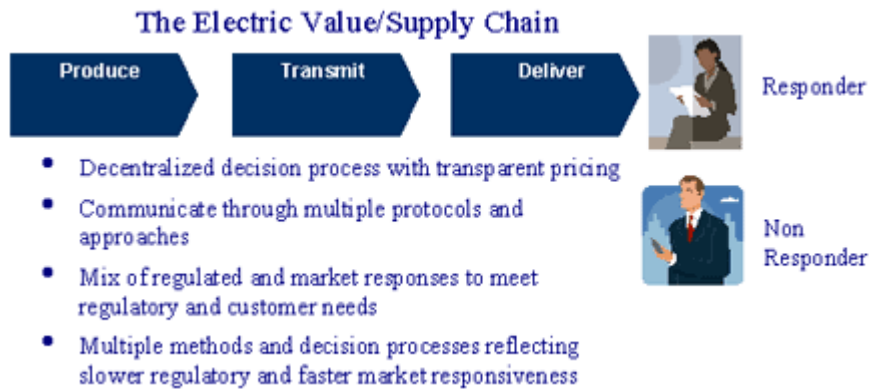
This article discusses how these issues underpin the potential success of DR as an option to meet future energy requirements.

An Evolving Regulatory Framework

In a fully regulated environment, the process of evaluating and implementing DR is less complex. The electric industry is vertically integrated, providing for a centralized decision process and consistent communication protocols and approaches. Benefits are shared among two major stakeholders, the consumer and the company, and the regulator assists in managing the risks of specific programs by providing cost recovery and in some cases the ability to earn on demand response investments. However the regulated process is methodical resulting in a lengthy decision process. Its focus is on meeting

regulatory needs, pricing and benefits among the different segments are not transparent, and complex issues, such as the equitable distribution of benefits, is determined by an administrative not market based process.

In a deregulated environment the electric value/supply chain is disaggregated into its components as shown in Figure 1.



A deregulated environment provides price and cost transparency and a market focus which assists the implementation of DR options. The market focus also provides a non administrative approach to equitably distribute the benefits of demand response among the stakeholders. However with a disaggregated electric value/supply chain the demand response decision process becomes decentralized and multiple communication protocols and approaches evolve. Benefits that were shared among two stakeholders in a regulated environment are now shared among four (4) independent stakeholders. As a result there may be communication and information transfer barriers and each stakeholder needs sufficient benefits to support the demand response investment, implementation and risks.

In a deregulated environment DR options can be offered by the regulated delivery company, ISO and Energy Service Providers (ESP). The availability of multiple programs and providers, while providing customers with choice and better meeting their individual needs, can also be confusing. For example, research conducted by the Distributed Energy Financial Group (DEFG) LLC identified a situation where a utility, in an effort to provide the appropriate price signals and move load to off peak periods, required large customers be served on time varying rates. Faced with this pricing scenario, a number of these customers selected to move to non time varying services offered by ESPs rather than manage their load.

Appropriate Reflection of Costs and Benefits

DEFG recently conducted research on a select group of utilities and attended the Mid Atlantic Distributed Resources Initiative (MADR) business case working group meetings to evaluate the issues associated with developing a business case for DR in today's energy environment. The results of this research indicate that a framework for a DR business case is a "work in progress" at this point in time. A number of delivery companies, in both regulated and deregulated environments, provide DR options as part of providing excellent customer service and feel that their customers expect this type of service from the delivery company. For these companies the cost of the programs is recovered in their tariffs so their focus is providing this service at minimum cost.

During the 80s and 90s a number of electric companies and jurisdictions required least cost plans for their vertically integrated companies. Most of these plans had a well defined framework for assessing the benefits and costs of DR programs. Our research indicated that these frameworks are being reviewed and modified to reflect the new energy environment and disaggregated value/supply chain. At present there is no standard or widely accepted business case framework for today's energy environment. Issues surrounding equitable distribution of benefits among the stakeholders remain and impact the level of resources committed to demand response options. Other issues impacting the development of a business case for demand response include:

- Level and variability of capacity payments- Presently in most of the country there is sufficient capacity resulting in low capacity payments. Also future capacity payments are volatile adding uncertainty and risk to the investment decision
- Assurance of performance- As with any new approach or technology there is uncertainty. Utilities and ISOs, being risk adverse, want to be sure that the DR will occur when needed. In most cases this results in additional hardware and monitoring costs reducing and sometimes eliminating any benefits
- Appropriately reflecting the interdependence of production and transmission on benefits- The availability of capacity can be just as dependent on the transmission capability as the generation capability. This interdependence has a direct relationship on benefits which is not always fully reflected in payments to DR providers

- Accurate inclusion of all appropriate benefits- Since there is not an agreement on what benefits should be included in a benefit cost calculation and the approach for calculating these benefits, they are not always included. This is especially important as the electric energy markets evolve because they are a combination of regulated and deregulated approaches. Unless there is agreement on the rules, and payments are aligned with the agreed to rules, the evolving market can not reflect the appropriate value and cost and allocate resource efficiently
- Keeping investors whole from an earnings perspective- DR will only be successful if customers select to participate. The local distributor is still the primary contact with customers and the community, especially for the mass markets. They are a very important to the success of DR. As a regulated entity, the local distributor is focused on providing excellent customer service for a fair price, and a fair return to its shareholders. Incentivizing local distributors to develop and promote cost effective DR programs can accelerate implementation
- Institutional Costs – Assuming there is some amount of regulatory oversight and administration, due to a hybrid (e.g., regulated and deregulated) environment, the determination of institutional roles and the payment of costs pose another barrier to realizing a clear picture of the benefits of DR

Conclusion

All of the issues above come together in the business case for DR. Even though there is not a standard or common business case approach, observations can be made regarding the benefits being considered in preparing a business case.

- Production capacity and energy benefits are the most widely accepted and used benefits in a business case; however, demand response has not been fully considered in discussions of resource adequacy, e.g., the amount of extra production needed to maintain reserve margins for reliability purposes
- Environmental benefits are most likely not included in the business case
- Incremental transmission benefits are most likely not fully included. Evaluating these benefits is difficult because cost changes are usually reflected through the regulatory process and averaged with other costs.
- Transmission projects do impact the availability of capacity and add to volatility in capacity benefits
- Distribution benefits have only recently been considered when evaluating demand response programs. The approach for including these benefits is not clearly defined at this point in time so it is unlikely that these benefits are presently included. Distribution benefits could be significant but concerns remain about the reliability of the demand response option during a reliability event.

Despite all these issues, the time is right for DR options. They provide innovative solutions, which when included in supply portfolios can assist in responding to today's energy problems. The successful use of DR options to meet future energy needs will depend on:

- Developing a standard framework for a business case. While much good work from the 80s can be a guide, the new approach must reflect the realities of the disaggregated value/supply chain, and interdependencies
- Standardizing transaction exchange approaches and protocols so information can flow freely. This is just as important as accurate pricing for demand response to be a success
- Focusing on customer needs to better understand the customer desires and preferences and how DR can assist them
- Market research and greater segmentation of the customer base to allow for more tailored, customer-focused offerings
- Enabling the use of DR options with technology, such as AMR, to provide needed information and make the transaction process efficient, effective and accessible
- Implementing policies that make the transaction efficient, effective and accessible. This includes standardization of approaches, free information flow and technology enablement

Readers Comments

Date	Comment
Jose Antonio Vanderhorst-Silverio 10.26.05	<p>I disagree in part with the authors. I believe that DR is a risk management function that should be marketed by a retailer, under a different value chain from the supply chain. I have just sent an article to the editor and here are 2 paragraphs in advance.</p> <p>The business case of Demand Response (DR) is enhanced under free markets, innovation, and probabilistic (risk) mindsets. DR is poised to be the demand side risk management tool to complement the traditional "LOLP" supply side risk management tool. There are two sides on the DR coin. On one side, system crashes are mitigated by a least cost mix of supply and demand risk management tools that may be applied in time and space. On the other, DR is the key to the segmentation of customers supply security (a kind of insurance). Because of its fine grain nature, DR can help mitigate delays (intended or not) of lumpy investments in generation, transmission, and distribution.</p> <p>A new supply chain is required in the power business for commercial activities, from generators and wholesale brokers, to competitive retailers, to end-users; while transmission and distribution monopolies are forbidden to interfere with those activities, charging a toll for their services. This is an essential element of the market design.</p>
	<p>José Antonio Vanderhorst Silverio, PhD Interdependent Consultant on Electricity javs@ieee.org</p>
Thomas Brunetto 10.30.05	<p>There are many reasons for a customer to select to participate in a DR option, one of them being risk management. A recent survey DEFG conducted indicated that cost reduction was the primary reason for customers selecting to participate in DR.</p> <p>We agree that free markets provide certain benefits to DR options, such as transparency. However free markets also bring additional complexities as we discuss in the article.</p>
	<p>The supply chain is critical to the success of DR. It isn't so much that a different supply chain is required, but instead the existing supply chain needs to transform to accommodate DR options under the new energy environment. Walmart is a good example. They didn't create a new retail supply chain. They transformed the existing supply chain to be more efficient and effective.</p>
	<p>The transformation of the existing energy supply chain includes being customer focused and establishing the standards and protocols for the multiple stakeholders that make it efficient and effective.</p>
	<p>I am not sure if your intent was that DR options should only be available to end-use customers, but to obtain the maximum value from DR it is important that these options be available to all parties. This includes end-use customers, utilities, suppliers and marketers so they can determine which options best meet their needs.</p>
Jose Antonio Vanderhorst-Silverio 10.31.05	<p>Thank you Thomas.</p> <p>I hope you received a copy of my rebuttal, which I sent via EnergyPulse. I will assume that to be the case.</p> <p>I understand that you agree that there is at least an Alternative to "The Business Case for Demand Response" reflected in the rebuttal, which is in the approval pipeline. That alternative has DR as a condition of service, so customers don't have an option, but could pay higher price to lower the risk of lack of supply under shortages. That is the same general mechanism of cost reduction to a customer which is willing to accept a higher risk.</p> <p>I agree that free markets bring more complexity when the value chain is the same as the supply chain. Much of the complexity identified in the article is linked to an outdated business model, which mixes a natural monopoly and a competitive business. Business model innovation will exploit the simpler value chain with advanced technology. However, retail deregulation reform is require to allow it in most places.</p> <p>On page 111 of the book "Profit Patterns," Adrian J. Slywostky characterizes, Wall-Mart business design as a special case of value chain profit pattern, called "Strengthening the week link." Certainly there are other business models on that book, not based on supply chains.</p> <p>The experience of interference by incumbent's utilities in several countries, like Spain, Chile, and in my country Dominican Republic, gives ample evidence of not allowing affiliates of monopolies to participate in the free market. I believe the main problem is perverse incentives. Marketing function is the most important activity of retailers, to segment customers on supply security risk. In my alternative, at the retail level, there is only one essential institution between the generator and the customer: the retailer.</p>
	<p>José Antonio Vanderhorst Silverio, PhD.</p>
	<p>Interdependent Consultant on Electricity.</p>

