



June 2009

Energy Efficiency: America's "fifth fuel" gets a makeover

For years environmental advocates and conservationists have been touting the benefits of the fifth fuel – energy efficiency. After all the cleanest and most efficient megawatt hour is the one never used, the negawatt. Energy efficiency does not depend on fossil fuels and is therefore not subject to potentially volatile shifts in global or domestic fuel prices. The capital costs associated with energy efficiency tend to be much lower than power plants, and energy efficiency measures help to reduce load and the need for expensive transmission projects and peaking power plants. In short, energy efficiency is the only new resource that can reduce and stabilize energy prices right now.

Yet, even with energy efficiency's many economic advantages over power plants, the idea of a negawatt plant competing head-to-head with traditional power generation seemed out of reach. Purchasers of electricity had no way to value energy efficiency in the market, and were stuck with just buying traditional electricity supply to serve their customers.

But this May, PJM Interconnection (PJM), operators of the electricity grid and wholesale energy market for Pennsylvania and much of 14 other states, made the negawatt plant a reality by officially recognizing energy efficiency as a financially rewarded source of power supply in the PJM territory. The addition of energy efficiency into PJM's capacity market will save energy and money for all customers in the PJM grid.

Introduction

In 2006, PJM began implementing its Reliability Pricing Model (RPM) as the new mechanism for valuing capacity resources. The capacity market is in addition to PJM's energy market, where buyers and sellers bid into the Day Ahead Market and Real Time Market to purchase or supply the regions energy needs.

Through this capacity market, PJM balances electricity supply and demand, ensuring that there is enough power available to keep the lights on in the region at all times, including a surplus to take care of unexpected spikes in demand or an outage of a major power plant. Historically, this has been accomplished by electricity suppliers and load serving entities owning and operating generation capacity, purchasing capacity from others or through the PJM capacity auctions. In accordance with this system,

every year PJM runs its Base Residual Auction (BRA) to determine the capacity needs for the next three years and who will deliver that capacity.

As part of the settlement which created RPM, the Federal Energy Regulatory Commission (FERC), which oversees wholesale electricity markets throughout the US, allowed for demand response resources that are dispatchable by PJM to bid into the BRA. However, non-dispatchable resources like energy efficiency that create permanent reductions in electricity demand were not allowed to participate. While energy efficiency projects were not allowed to participate in the first RPM auctions, FERC ordered PJM to consider ways in which energy efficiency projects could participate in future auctions.

Following many months of discussions with PJM stakeholders, in December PJM submitted its market rules for including energy efficiency into RPM, which was approved by FERC in March 2009. The final ruling states that energy efficiency resources will be paid the market clearing price in each year they clear the auction for four consecutive years.

Now for the first time, energy efficiency projects were able to bid into the RPM auctions held May 4 - 8, 2009 to meet peak power demands for the 2012-2013 delivery year. A total of 10,464 MW of new capacity was selected with 569 MW coming from new energy efficiency resources. Most of the energy efficiency resources came from territories outside of Pennsylvania including of Baltimore Gas and Electric, ComEd in Chicago and PEPCO in D.C. and Maryland. But it is likely that new investments in efficiency in Pennsylvania will allow our state's utilities to bid into the market next time around.

Why Energy Efficiency?

While the inclusion of demand response resources into PJM has helped to lower costs in the wholesale electricity market, energy efficiency measures have the ability to permanently reduce demand, creating even more savings over time. Permanent reductions in overall demand can offset the need for new power plants, transmission and other infrastructure.

PJM is required to maintain very expensive and little-used capacity to meet peak electricity demand. In fact, almost 20 percent of the cost to serve a residential customer

annually is due to the cost of insuring supply during the 100 hours of highest demand. This could be addressed more efficiently and less costly through load reductions.

Energy efficiency resources cost much less than peaking power sources needed to meet those highest 100 hours of demand. Including energy efficiency resources to bid into the BRA will help to further lower the auction clearing price and lower the cost of capacity to all customers within PJM. PJM has calculated that even small reductions in peak demand can lead to much larger reductions in peak price, or a 1 percent reduction in peak demand can lead to a 10 percent price reduction.

Allowing energy efficiency resources into PJM's capacity market provides benefits not only to the customer that installs the measure, but to all customers in the region. The customer installing the energy efficiency measure will be able to reduce her/his monthly electricity bills and receive a capacity payment if she/he bids into the market. Additionally, all customers in the region will benefit from reduced demand charges in the area where the energy efficiency measures are installed, and reduced capacity and energy prices when lower energy efficiency resources displace higher cost generation.

Experience up North

ISO New England (ISO-NE), the regional transmission organization for New England, has already incorporated energy efficiency into its forward capacity market and can help to shed light on what to expect.

In June 2007, FERC approved the inclusion of energy efficiency resources into ISO-NE's Forward Capacity Market. ISO-NE held its first Forward Capacity Market Auction in February 2008 for capacity supply obligations for the power year beginning June 1, 2010.

The first auction showed promising results, with new energy efficiency measures beating out bids for new supply. ISO-NE selected 1,118 MW of new demand side projects, but only 626 MW of proposed new power generation. New energy efficiency measures made up 45 percent of the new demand side projects.

A significant portion of the new energy efficiency measures were bid in by electric utilities in the New England states. Through statewide system benefit funds, utilities or third party administrators offer energy conservation programs to their customers, installing energy efficiency measures at homes and businesses. For the first time, these utilities were able to bid in these measures into the Forward Capacity Market and receive an additional revenue stream.

For example, in 2008, Massachusetts utilities received roughly \$150 million in system benefits funds to implement

energy efficiency measures in the Commonwealth. The measures installed in that year that were able to receive capacity revenues (mostly lighting) will accrue roughly \$34 million from the wholesale capacity market over seven years. This is a 3 percent increase in the budget each year that so far is set to be spent on installing additional measures.

ISO-NE's experience is not a crystal ball for how PJM's market will develop due to a significant difference in the way energy efficiency resource receive payments. In PJM, energy efficiency resources can only bid and receive payments for four consecutive years, when in fact these measures continue to produce savings well after the fourth year. In ISO-NE, energy efficiency resources can bid and receive payments for their full lives, which can range from around seven years for commercial lighting to up to 20 years for heating systems.

If energy efficiency is to be given a fair chance to compete with generation, PJM should look to the ISO-NE model and allow efficiency resources to receive capacity payments for each year of their useful measure lives, just as generation resources receive payments for each year they provide generation for capacity.

Jumping into the market

While the first BRA to include energy efficiency has passed, it's not too soon to learn how to prepare for next year's auction.

In order to participate in the RPM, an entity must be a member of PJM or use a Curtailment Service Provider (CSP) that is already a member. PJM's rules state that the minimum amount of energy savings eligible to bid in the auction will be 100 KW. Due to this large minimum bid requirement, both utilities and CSPs bundle the peak demand savings from groups of residential and small commercial customers to meet this savings requirement.

Experts in the field expect the market to include a wide range of participants in the future. In the near term, utility companies with existing programs will likely be the major energy efficiency providers in the capacity market, followed by large industrial and commercial customers with large electricity loads. The last entrants to the marketplace will be non-utility aggregators for smaller residential and commercial customers that on their own would not have enough energy savings or the tools to be able to participate in the market themselves.

According to PJM, qualifying energy efficiency resources include efficient lighting, appliance, or air conditioning installations; building insulation or process improvements. Essentially any measure that can achieve a continuous reduction in demand for electricity throughout the year qualifies.

Since the capacity market is looking to meet peak demand, the energy efficiency measure can count only electricity savings during PJM's "Energy Efficiency Performance Hours" which are between 3:00 and 6:00 p.m. from June 1 through August 31. In order to ensure that these energy efficiency measures are creating real and dependable capacity reductions, PJM created rigorous measurement and verification standards. Larger consumers that participate in demand response programs typically have interval meters that can measure actual KW reductions; most energy efficiency projects are found in the small commercial and residential sector without such meters. In order not to exclude this large reservoir of potential energy savings, [The PJM Manual for Energy Efficiency Measurement & Verification](#) was released in April 2009 to address this issue.

The main catch with the BRA is timing. For the next auction in May 2010, energy efficiency measures installed prior to June 2009 are included in PJM's 2010 peak load forecast and cannot participate in that auction. For a measure to participate in the May 2010 BRA, it must be installed by June 2010. For the 2011 auction, energy efficiency measures cannot be installed prior to June 2010 and must be installed by June 2011 to participate.

Lastly, there is good news for those who already participate in the PJM demand response market as they may also be eligible to participate in the energy efficiency market.

PJM states that a consumer can choose to participate in both if they take specific actions. For example, a

consumer may already be participating in the demand response market by dimming lights, turning on back-up generation or shutting down an electrical process when PJM calls for a reduction. If that consumer also replaced his/her HVAC system with one more efficient than the current standard or installed higher efficiency lighting, he/she could also participate in the RPM as an energy efficiency resource.

Looking forward

Allowing energy efficiency to participate in PJM's capacity market opens a whole new world for the negawatt. No longer the mythical fifth fuel, energy efficiency is now a legitimate player.

While there was little to no participation from energy efficiency resources in Pennsylvania this time around, with increased investment through Act 129 (mandating energy conservation programs), the \$650 Alternative Energy Investment Fund, and new federal stimulus money, there will soon be numerous projects eligible to participate in PJM's capacity market. With clearing prices per megawatt day ranging from \$133.37 up to \$222.30 in the last auction, there is a tremendous revenue stream for projects to tap into.

Only time will tell, but the new market for energy efficiency should mean more energy efficiency resources in Pennsylvania, helping reduce our reliance on fossil fuels and save all electricity consumers money.