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Via Overnight Mail

February 21, 2006

Beth A. O'Donnell, Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40602

RECEIVED
FEB 2 2 2006
PUBLIC SERVICE COMMISSION

Re: Case No. 2005-00341

Dear Ms. O'Donnell:

Please find enclosed the original and twelve (12) copies of the materials relating to the PJM demand response program as requested by the Commission in the above referenced case.

By copy of this letter, all parties listed on the Certificate of Service have been served. Please place this document of file.

Very Truly Yours,

David F. Boehm, Esq.
Michael L. Kurtz, Esq.
BOEHM, KURTZ & LOWRY

MLKkew
Attachment
cc: Certificate of Service
Richard Raff, Esq.

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing was served by mailing a true and correct copy, by first-class postage prepaid mail, and electronic mail, (when available) to all parties on the 21st day of February, 2006.

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Finding the Balance: Adding Demand Response to the Market Scales
DRAFT Jan. 19, 2006
Tom Welch

Introduction

When I joined the Maine Public Utilities Commission as chairman in 1993, I was drafted to a softball team called the NegaWatts. At the time, I was a bit put off by what I perceived to be a staff bias in favor of "conservation at any cost" rather than a more balanced approach to the economics of electricity price regulation. It was thus mildly ironic that, towards the end of my twelve year stay at the Maine PUC, the legislature decided that the commission would be the best "home" for electricity conservation and efficiency programs. I left the commission with a great deal of pride in the excellent work done by the Efficiency Maine staff and an appreciation for the positive role that increasing the efficiency of our use of electricity can play in our electricity markets and in the economy as a whole.

But, it has become clear to me and to many others that the advances in the efficiency of electricity use, while essential, do not by themselves capture the economic opportunities available for demand behavior in the electricity markets. As wholesale electricity markets mature, the role that "real time" demand response can and must play has come into focus. Indeed, in its recent report on electricity restructuring, the U.S. Government Accountability Office (GAO) identified connecting wholesale markets and retail markets as one of four key challenges to the effective operation of the electric power industry and noted that "connecting wholesale and retail markets through demand-response programs… would help competitive electricity markets function better, enhance the reliability of the electricity system, and provide important signals that consumers should consider investments into energy-efficient equipment."[1]

A major shift toward greater efficiency and lower cost for our entire electricity production system is possible. What is required for that shift is a sufficient proportion of customers treating electricity as they do other commodities: curtailing their demand when the cost, as revealed by an efficient market, exceeds the value of the commodity to them. As the GAO report concluded, the challenge for policy makers at the federal and especially the state level is to find ways to encourage the full flowering of demand response as an economic force in the marketplace.

The Potential

The basic point of a sound market is to allow the capture, by the actor, of the economic value of the action. Demand response is currently underdeveloped, and the potential benefits of bringing demand response into parity with production are enormous.

[1] United States Government Accountability Office, Electricity Restructuring, Key Challenges Remain, GAO-06-237, November 2005, p. 16.

One way to show the potential is to examine the shape of the supply curve. Here is the PJM Interconnection supply curve for two summers, 2003 and 2004:[2]

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These are fairly typical pictures for electricity systems. Especially interesting is that the prices for the first 90 per cent of the system peak load range from roughly zero to $100/MWh (in this example), while the prices for the last 10 per cent of the load range from roughly $100/MWh to $1000/MWh (and might be higher but for the offer caps in place). What would be the impact on the shape of this curve and the duration of the higher end prices if there were sufficient demand response to curtail 10 per cent of the demand on the system? There might be enough potential curtailment at prices above $100/MWh to flatten the price duration curve significantly. Indeed, as the chart below shows, there has been a significant amount of demand response activity under PJM's programs even at prices well below $100/MWh:[3]
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In order to test the potential impact on price, the PJM Market Monitor calculated the impact that reducing demand by 1000 MW at various points on the supply curve would have had on a particular day in 2005. At the very steepest parts of the curve, the impact is dramatic: based on bid data, the difference of 1000 MW in demand when the supply curve is between 162,000 MW and 164,000 MW is over $260/MWh. Even where demand is lower, the impact is significant: between 90,001 MW and 100,000 MW, for example, the average price impact is over $1.15/MWh for every 1000 MW in load reduction. When accumulated over the hundreds of millions of MWhs consumed just within the PJM region, the possibility of savings to consumers and the economy is worth our attention.

Aside from the impact on the price curve, the potential impact of demand response on the capacity needs of the system also is significant. Without demand response, there must be enough "iron in the ground" to provide service at peak hours even if, as the chart below shows, those hours are infrequent:[4]

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While the peak load for 2004 exceeded 95,000 MW, the number of hours during which the load exceeded 75,000 MW was less than 3 per cent! And the number of hours when the load exceeded 85,000 MW was less than 1 per cent! We should be able to find market structures and policies that avoid our current need to keep so much iron in the ground that operates during so few hours. Demand response offers the prospect of reducing or even eliminating the need for such indolent iron.

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[2] PJM Market Monitoring Unit, 2004 State of the Market, March 8, 2005, at p. 49.
[3] Op. cit. p. 93
[4] Op. cit. p. 293

Market power is another persistent concern in electricity markets, in part because when a supplier knows it must be dispatched in order to preserve reliability (i.e. its bid must be accepted), the price it will bid is constrained only by bid caps or mitigation rules. The effect of widespread demand response, however, might significantly reduce such opportunities. If, for example, a supplier knew that there was an additional 10 percent or 15 per cent "capacity" in the market in the form of demand response, any attempt to take advantage of its "pivotal" position would be made more difficult: consumers would have the ability to decline to buy the product at the inflated price.

Current Status of Demand Response

Unfortunately, demand response remains underdeveloped. As the following chart shows, demand response currently represents only 0.1 per cent of the market for electricity.

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The trend over the past few years has not been encouraging.

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Nevertheless, the country's appetite for advancing demand response (and its cousin, efficiency) may be increasing. First, the unfortunate fact that energy costs have risen dramatically, due predominantly to increases in fuel costs, immediately improves the economics of demand response. Under the plausible assumption that at least some demand is sensitive to price, unless the end-use value is increasing as fast as energy prices, the amount of demand that is likely to be curtailed in response to price very likely will increase.

Perhaps as important, technology has advanced significantly, especially in the areas of "real time" measurement for small loads and in "smart" devices that can be integrated into appliances and respond automatically to system conditions or be "called" in "real time" in response to price. Thus, the cost to the system as a whole to implement "demand-friendly" technologies and policies continues to decline just at the moment when the value is most readily apparent.

Wholesale Market Initiatives

Under current retail price structures, the value of the reduction to the system is likely to be significantly different than the value of the reduction to the actor. For example, turning off a light at 2 a.m. has much different impact on production cost than turning off light at 2 p.m., but the financial consequence to actor is likely to be the same. Similarly, for a major industrial customer, the cost of reducing production may be less than the "real-time" locational marginal price (LMP), but the retail price may not reflect that LMP, leading to dead-weight loss to economy (where, for example, a customer is using $500 worth of electricity for which it pays $200 to produce $250 worth of goods).

Because retail price structures generally do not reveal "real" costs to most customers, it makes sense for those charged with developing the wholesale market to find ways within the wholesale market to provide to customers the benefits of their demand reductions under specified circumstances. The basic principle of integrating demand response into the wholesale market is to provide to the customer (in effect, "reveal") the value of the real time LMP *outside the retail rate design*, and thus provide the appropriate economic signal to the customer (by, in effect, allowing consumers to participate directly in the wholesale market). The customer then has a basis upon which to know – and care about – when the value of her electricity-driven activity is less than the costs she imposes on the electric production market. In essence, the customer receives the value of the avoided production

To move toward that goal, PJM is currently advancing several initiatives:

- PJM has asked the Federal Energy Regulatory Commission (FERC) to allow demand response to provide certain ancillary services. We believe we are the first regional grid operator to fully integrate demand response into the ancillary services market. The value created by the customer's reducing demand, or being able to reduce demand, can be captured for a variety of purposes, including "regulation" and "synchronized reserves." These are system needs whose value is already identified in the market. To the extent that reducing demand – or the ability to reduce demand at the request of the system operator – has a higher economic value than the customer's use of the electricity, the programs allow that higher value to be passed to the customer.

- A second part of our FERC filing would allow demand to participate as an emergency resource and to receive capacity payments. Demand can and should play a part in avoiding more draconian interventions when the supply/demand situation deteriorates rapidly. The refinements we proposed in "emergency load response" will allow the PJM operators to draw on opportunities for demand response in a manner more like they treat generation and also provide appropriate – and comparable to generation's – economic incentives for demand to participate.

- Finally, PJM's FERC filing proposes to make our Economic Load Response program permanent; that program currently is set to expire at the end of 2007. Under this program, by bidding in the Day-Ahead and Real-Time markets, customers can capture the "real" economic value of the reduction by receiving at least the difference between the LMP and their retail rate for the amount of the reduction. Making the program permanent can provide the stability the marketplace needs for investment in demand response.

While vital to identifying opportunities for economic impact and useful for larger customers where retail rate structures do not fully reflect underlying costs, efforts at the wholesale level are unlikely by themselves to bring demand response into the market sufficiently to capture the benefits of full integration. For that reason, it is time for state authorities to closely examine pricing policies now in use to determine whether and how those policies can and should be amended to encourage demand response. Three areas in particular may require close attention: first, the relationship between utilities and demand response programs; second, the degree to which the costs of new and demand-friendly technologies such as smart meters have achieved "public good" status; and finally the retail rate designs themselves.

Reflections on Utility Attitudes

Electric utilities are not charitable organizations and should not be expected to behave as if they were. Therefore, it is paradoxical that policy makers often turn to utilities to design and operate programs intended to persuade customers to reduce the use of the utility's product. While not unprecedented in our economy (cigarette companies warning against smoking come to mind), it surely would be better to build a system where it was not necessary to police the extent to which companies execute a mandate directly contrary to their economic self interest.

In the world of vertically integrated utilities, there has been a certain logic to combining both conservation and demand response programs with the utilities' obligations to serve. Where, for example, demand response could delay or obviate the need for a new peak load unit, or where fuel savings could be achieved by reducing demand during certain periods, a utility would benefit from the opportunity to curtail load. Similarly, increased efficiency overall in the system might allow deferring a new plant or new purchases, again achieving economic gains for the company. Even where those conditions existed, however, there always was a certain skepticism that utilities were not acting with the same enthusiasm in encouraging conservation as they did in expounding on the need for a new power plant.

Where generation has been separated from transmission and distribution, however, whatever economic benefits a utility might have achieved from demand response or conservation are severely muted if not eliminated entirely. Except in the unusual case in which the marginal cost of distribution or transmission exceeds the marginal revenue from "through-put," the utility has every financial incentive to encourage as much consumption as possible. The generator, for its part, also is likely to be interested in selling rather than curtailing.

A variety of responses have been offered to address the issue. Some suggest that the enthusiasm of utilities for demand response and conservation programs can be rekindled by making them "whole" financially for losses due to their conservation efforts. Others suggest that redesigning rates, (for example, by flattening the distribution rate structure to collect more in fixed costs) would minimize utility objections to such programs.

While the primary purpose of my observations here is to encourage debate and resolution, I admit to a bias toward solutions that, rather than trying to ameliorate the effects of policies that distort prices, try instead to bring the prices and policies themselves into conformity with the underlying economics of the system. Thus, it may be wiser to work on the distribution rate design and even to give the task of developing and implementing conservation and demand response programs to people with less complicated incentives (as Maine, Oregon and Vermont have done, for example), than to try to find rate and profit adjustment mechanisms that will pull reluctant actors along.

New Technologies as Public Goods

The debate over what costs should be spread over all electricity consumers and which costs should be borne by those who benefit directly is familiar to regulators. A closely analogous debate recurs in legislatures when the imposition of standards is considered: at what point is the adoption of a product sufficiently valuable to the society as a whole to require everyone to pay a share, whether or not any particular consumer would have chosen to buy the product on his own. These debates resonate in the demand response arena.

When the issue of requiring utilities to replace current meters with meters capable of determining not only the amount used but also the time of use first came to the commission in Maine, the cost of the new meters, when weighed against the then available benefits to consumers, led to our decision not to impose such a requirement. Times have changed. The cost of new interval meters has fallen substantially (from an estimated $400-$1,000 per installation eight years ago to something on the order of $118 today). These costs can be expected to fall further given the scale and scope of advanced metering infrastructure projects contemplated by California, Ontario and TXU Corp. in Texas. New opportunities for consumers to capture the economic benefits have emerged as wholesale markets provide transparent information about "real time" costs. We may have reached the point at which the benefits achieved by giving all customers the tools to adjust their usage based on the "real-time" –not just average – cost of what they consume are substantial enough (in terms of lower overall costs, greater overall consumer surplus, and reduced capacity requirements) to warrant treating the installation of such meters as an integral part of utility service. Another approach worth examining is whether and, if so, how metering itself can be subjected to competition and greater efficiency. For example, a stand-alone entity could provide metering infrastructure and usage data storage and retrieval for various utilities, customers, agents for customers and regulators.

Technologies that can now be integrated into the appliances that use electricity intensively, such as water heaters and air conditioners, can respond not only to electronic commands based on pricing (or other) algorithms but also to changes in the stability of the system itself. For example, some devices can detect reductions in reactive power and adjust the operation of the machine accordingly. The cost of these devices is falling, thus again raising the question of whether, or perhaps more accurately when, such devices should be encouraged by appropriate pricing approaches or incentives or made a standard part of electricity-intensive appliances. Moreover, the emergence of such devices makes even more important the efforts to ensure open architecture and opportunities for new entry in all aspects of the electricity delivery stream.

The Retail Rate Challenge

It is easy for those of us who have left positions at state commissions to say that states should revise their retail rate structures to pass through to customers the "real-time" cost of electricity production. In theory, this is the optimal solution. If a customer can see (preferably far enough in advance to act) the cost of continuing to use electricity, she can make an efficient economic choice about whether or not to use it. Put another way, the customer saves (by not paying) exactly what the system saves by not producing.

However, under the vast majority of current retail price structures there is a disconnect between the price the customer sees for any particular interval and the corresponding cost to the system. For residential customers, who for the most part have rates that are not differentiated even by season let alone time of day, the disconnect is complete: like the stopped clock that is correct twice a day, the economics for the customer will match the economics of the system only when the wholesale cost crosses the retail price on the way up (in the morning) and on the way down (in the evening) – though the disconnect during certain periods is likely to be so complete that for long periods the curves never cross at all.

Even for commercial and industrial customers, with few exceptions, the retail price/system cost disconnect is significant enough to blunt the economic signals that would help the market achieve greater efficiency.

This disconnect at all levels has created one of our most difficult policy challenges. If it is not possible or practical to move all customers to "real-time" rates for their electricity, how can we give customers the economic incentives that match the economics of production?[5] One approach is to allow customers, regardless of their retail arrangements, to "bid in" curtailment and receive and even set the clearing price for electricity in "real time." Where the retail price that the customer would have paid is netted against the clearing price payment (to avoid the effect of paying the customer twice for his action), this approach creates the exact incentives from the customer's perspective as a "real-time" retail rate: the rational customer will curtail usage at exactly the point where the cost to the system of production is greater than the value to the customer of the corresponding consumption.

Unfortunately, this approach neatly avoids a question that is likely to become more important as demand response becomes a more pervasive part of the market: What exactly is the customer buying from the retail provider that can be resold into the market? Where the customer has a firm contract to purchase a particular amount of electricity at a particular price, it seems clear that the customer should be free to resell that amount back into the market. Few customers have such contracts; most simply have an arrangement

[5] Of course, there is nothing even now that prevents an entrepreneur from providing a fixed price to the end use consumer and charging that consumer for the hedge against price volatility or further providing the consumer with the tools to adjust usage in response to price and sharing the economic benefits. Relying entirely upon load serving entities to develop those products, however, may be insufficient to produce the widespread behavioral changes that will in turn provide the full benefits of demand response in the market.

whereby the retail supplier will sell them at a predetermined price whatever electricity the customer demands. The closest analogy may be to a call option for the customer, but ordinarily call options have specific quantities associated with them, something missing from most retail electricity arrangements.

From the retail supplier's perspective, the prospect of customers' exercising call options at a fixed price for uncertain (perhaps unlimited) quantities and then reselling the electricity back into the market creates some new challenges. The most obvious is that it would become more complicated (though perhaps not impossible) to predict and plan for the size of its load, since the degree to which customers acted on the changes in wholesale market price would have to be accommodated. Another factor would be how to price the product in the first place: where there is a chance that in periods of high wholesale prices it is the customer who can reap the benefits of reselling something bought at a lower price, it would be logical to expect that a premium would be attached to the price to balance the lost opportunity cost.

In order to avoid the full force of this issue, some have suggested that retail pricing could be redesigned to include the concept of "critical peak pricing." Under this approach, the supplier offers the customer a core price for a relatively high, but fixed in advance, amount of usage. For usage exceeding the specified amount, the customer would pay a pre-defined "peak" price. To be fully effective, however, such a system would need to be operated to ensure that the "peak" price signal matched the times of high system cost.

None of this is to suggest that the substantial benefits available from demand response will not be realized unless all retail rates move to "real time" reflections of the wholesale spot market, nor to suggest that programs that allow customers to capture the economic value of curtailment are fundamentally incompatible with existing retail structures. I merely suggest that, as demand response assumes a more prominent place in the market, the resolution of these issues will become more important.

Conclusion

The potential that demand response offers for increasing the efficiency of electricity production is clear. Developments in wholesale market structure which illuminate the value of demand response and developments in technology that will allow even the mass market to help capture that value mean that we are poised to solve at last the imbalance in the electricity market created by the inability to store electricity and the inelasticity of demand that have bedeviled us for a century. We should embrace the opportunity and work together to develop the policy and technical tools to ensure that potential is realized.

Thomas L. Welch is vice president of External Affairs for PJM Interconnection. Prior to joining PJM in April 2005, he served for 12 years as the chairman of the Maine Public Utilities Commission.

calendar year. Special members whose contribution toward the annual membership fee equal $5,000 under this program shall nonetheless retain the status of special members and may not convert to full membership in the same year.

- Special members are limited to participating in the PJM markets as Market Sellers, which means that they are qualified only for the Economic Load Response Program – Real Time;
- Voting Privileges and sector designation are waived
- Thirty day notice for waiting period is waived.
- No PJM-supported user group is permitted.
- Effective on the start of any calendar year, a special member may convert a pre-existing special membership to a full membership subject to all PJM rules governing membership, including regular application and membership fee requirements.

Acquiring/Updating an eSuite Account

(7) Registration for the PJM Load Response Programs will be accomplished via the Load Response Program application under eCapacity in eSuites.

(8) In order to register end-use customers for the program, once PJM membership has been obtained, new members will need to acquire an eSuites account.

(9) Existing eSuites users may utilize their current account for the purposes of the Program and do not need to acquire a new account. However, current eSuite users must update their existing account information to designate that they need access to the Load Response Application.

(10) When acquiring and/or modifying an eSuite account, all Participants must designate that they need access to the Load Response Application.

(11) Participants must complete an "Authorization to Use PJM Internet Business Tools" form and designate the company's CAM manager for the Load Response Program application on the authorization form

(12) The company's CAM manager will receive access and can give access rights to the Load Response Program application to other users in the company.

(13) A current eSuite user may also use the "User Change Form" in eSuite to add access to the Load Response Program application.

(14) If a new participant, the new CAM manager will receive email from PJM that approves access, and provides a userid and password

Registering Participants

(15) Once PJM Membership and an eSuites account has been obtained and/or modified, Program Participants may register end use customers for participation in the program.

(16) Program Participant registers for the PJM Load Response Programs via the Load Response Application under eCapacity in PJM eSuites.

(17) In order to register end use customers for the PJM Load Response programs, the following Customer Information needs to be provided for each end use customer:

- End-use customer name
- Indicate if participating in an ALM program
- ALM Provider
- Customer's energy supplier
- Program Option
- EDC Account Number
- Pricing Zone (Transmission Zone or Aggregate)
- Retail Rate
- Loss Factor

(18) In order to register end use customers for the PJM Load Response programs, the following Operational Information needs to be provided for each end use customer:

- KW quantity to be reduced
- Availability of the demand resource during non-summer months (October 1 through May 31).
- Locational Marginal Price (LMP), in $/MW, at which the load shall be reduced in the Economic Load Response Program and/or the Minimum Dispatch Price, in $/MW, at which the load shall be reduced in the Emergency Load Response Program.
- Load Reduction Method
- Time, in minutes, to reduce
- Metering Requirements
- Indicate if a Weather Sensitivity Adjustment (WSA) will be applied
- Weather Station
- Type of Back Up Generation
- KW quantity of Backup Generation to be reduced
- Locational Marginal Price (LMP),$/MW at which Back up Generation to be reduced

- Fuel type of Back up Generator
- Indicate if a load reduction may be dispatchable in real time operations
- Shut Down Costs for Period 1, April 1 - Sept 30
- Shut Down Cost for Period 2, October 1 - March 30
- Minimum Down Time, in hours

(19) End-use customers may not be registered simultaneously in the Economic Load Response Program and the Emergency Load Response Program.

(20) End-use customers may switch programs upon one day notice if it has participated in the same load response program for 15 consecutive days.

(21) Program Participant intending to run distributed generating units in support of local load must represent in writing to PJM that it holds all applicable environmental and use permits for running those generators. Continuing participation in this program will be deemed as a continuing representation by the owner that each time its distributed generating unit is run in accordance with this program, it is being run in compliance with all applicable permits, including any emissions, run-time limit or other constraint on plant operations that may be imposed by such permits.

(22) PJM will confirm with the appropriate LSE, EDC and ALM Provider whether the load reduction is under other contractual obligations. (The EDC and LSE have ten (10) business days to respond or PJM assumes acceptance.)

(23) Other contractual obligations may not preclude participation in the program, but may require special consideration by PJM such that appropriate settlements are made within the confines of the existing contract.

(24) PJM will confirm with the customer's LSE whether the customer is served under Day Ahead or Real Time LMP-based contract for energy delivery PJM will further verify the nature of the Program Participants LMP-based contract.

(25) For purposes of the PJM Load Response program, an LMP-based contract is defined as one by which an end-use customer has agreed to pay its Load Serving Entity (LSE) for the physical delivery of energy according to the hourly value of the Locational Marginal Price (LMP) as calculated by PJM. The bus, zone, aggregate, etc at which the LMP forms the basis for the contract is immaterial. The LMP on which the contract is based can be either day-ahead or real time, and is assumed to be some multiple of the actual, calculated LMP.

(26) End-use Customers that have LMP-based contracts under which they have agreed to pay their LSE for the physical delivery of energy according to the hourly value of the real-time LMP as calculated by PJM may participate in the real time market as provided for under the Real Time Operations section below.

(27) PJM will verify the transmission and generation (retail rate) charges with the appropriate EDC/LSE

(28) PJM will verify whether or not a Program Participant is an ALM customer. PJM will further verify the nature of the Program Participants ALM contract.

(29) PJM will inform the Program Participant of the acceptance into the program.

(30) PJM will notify the appropriate LSE and EDC of the participant's acceptance into the program.

Acquiring an eMKT Account

(31) Participants in the PJM Economic Load Response Program have the option to submit Load Response Bids in the Day Ahead Market. Load Response Bids are submitted via the PJM eMKT website. Once PJM membership has been obtained and end-use customers are registered for the program, participants will need to acquire an eMKT account.

(32) Existing eMKT users may utilize their current account for the purposes of the Program and do not need to register for a new account.

Emergency Operations

(33) Participants in the Emergency Load Response Program may reduce load upon notification from PJM. Notification shall be posted on the PJM web site and eData, as well as distributed via the majordomo email list.

(34) The PJM Dispatcher issues Maximum Emergency Generation.

(35) The PJM Dispatcher notifies PJM OI Management, PJM OI public information personnel, and Local Control Center dispatchers.

(36) The PJM Dispatcher indicates the need for emergency energy and contacts its neighboring control areas.

(37) The PJM Dispatcher recalls off-system sales that are recallable (network resources).

(38) The PJM Dispatcher begins to load Maximum Emergency Generation, and begins to purchase emergency energy from PJM Members and from neighboring control areas based on economics and availability.

(39) The PJM Dispatcher continues with the remaining emergency procedure steps (including Load Management Curtailments, Steps 1-4 and then Load Reduction Action) as stated in the PJM Manual for Emergency Operations, and cancels them in reverse order when appropriate.

(40) The PJM OI dispatcher cancels the load reduction request and then cancels Maximum Emergency Generation, when appropriate. The minimum duration of a load reduction request is two hours although the reduction request may be extended if necessary.

Day Ahead Operations

(41) Participants, except end-use customers that have LMP-based contracts under which they have agreed to pay their LSE for the physical delivery of energy according to the hourly value of the real-time LMP as calculated by PJM, have the option to participate in the Day Ahead market. Participants in the Economic Load Response Program may submit a bid to reduce the load they draw from the PJM system in advance of real time operations. In the Day Ahead market, the participant may submit a Load Response Bid on behalf of a Demand Resource ("Load") for a specific KW curtailment (in minimum increments of .1 MW or 100 KW).

(42) End-use customers that have LMP-based contracts under which they have agreed to pay their LSE for the physical delivery of energy according to the hourly value of the real-time LMP as calculated by PJM, do not have the option to participate in the Day Ahead market.

(43) Each Market Participant's profile (which is defined by PJM) shall specify the transmission zones or aggregates for which that Participant is eligible to submit load response bids.

(44) Load Response Bids are assumed to include losses (transmission zone losses and share of 500 kV losses).

(45) Load Response Bids shall specify for each Demand Resource ("Load"):

- KW quantity to be reduced
- Location (transmission zone or aggregate)
- Price, in $/MW, at which the load shall be curtailed

(46) The Load Response Bid could also include for each Demand Resource ("Load"):

- Shut down costs, for each period
- Minimum down times for which the load reduction must be committed

(47) Shutdown costs and minimum down times are optional, and will default to zero (0) if not submitted.

(48) Shutdown cost will be expressed in dollars, and represents the fixed cost associated with committing a load response resource.

(49) Shutdown costs will be changeable only every six months, corresponding to the six-month periods during which price-based start-up costs may be changed for generators.

(50) The six month periods for shutdown costs are defined as follows: Period 1 is defined as April 1 - September 30 and Period 2 is defined as October 1 - March 30.

(51) Minimum down time will be expressed as a number of hours, and represents the minimum number of contiguous hours for which a load response bid must be committed in the Day-Ahead market.

(52) If a Program Participant submits no day-ahead bid information, then a zero KW quantity is assumed.

(53) The list of transmission zones and aggregates which Load Response Bids are accepted is defined by PJM.

(54) All Day Ahead Load Response Bids will be submitted to the eMKT website by 1200 each day.

(55) The Day Ahead Market closes at 1600 each day, and cleared Load Response Bids will be posted to eMKT.

Real Time Operations

(56) Participants including end-use customers that have LMP-based contracts under which they have agreed to pay their LSE for the physical delivery of energy according to the hourly value of the real-time LMP as calculated by PJM, have the option to participate in the Real Time market. Participants in the Economic Load Response Program may choose to commit to a reduction of the load they draw from the PJM system during times of high prices. The participants in the Program are responsible for determining the conditions under which load reductions will actually take place and implementing the reductions should those conditions arise.

(57) End-use customers that have LMP-based contracts under which they have agreed to pay their LSE for the physical delivery of energy according to the hourly value of the real-time LMP as calculated by PJM, have the option to participate in the Real Time market under the following circumstances. The end-use customer or its representative (LSE/CSP) shall provide PJM with a "strike" price for the end-use customer's zonal LMP at which the end-use customer will reduce load, as well as any shutdown costs and opportunity costs and costs associated with the minimum number of contiguous hours for which the load reduction must be committed.

(58) In cases where the zonal real time LMP reaches the "strike" price and the load response is dispatched by PJM, PJM shall pay such end-use customer the difference between the actual savings achieved based on zonal LMP and the total value of the end use customer's load response bid, if savings achieved by the end-use customer are less than the total value of the load response bid. For purposes of this provision, the load response bid will be the sum of the "strike" price times the MW of reduction achieved during each hour of the time period the reduction was dispatched by PJM or minimum down-time whichever is greater, plus submitted shutdown costs.

PJM Load Response Programs – Business Rules

Revision #4: Revised November 4, 2005

(59) Each program participant is responsible for maintaining the load reduction information associated with each end use customer signed up for the program via the Load Response Program Application under eCapacity in eSuites.

(60) At the time of registration, each program participant shall specify for each Demand Resource ("Load) the following operational information :

- KW quantity to be reduced.
- Locational Marginal Price (LMP), in $/MW, at which the load shall be reduced ("strike" price)
- Pricing Zone (transmission zone or aggregate)
- Load Reduction Method
- Time, in minutes, to reduce
- Indicate if a load reduction may be dispatchable in real time operations
- Indicate if the participant is an LMP-based customer
- Shut Down Costs for Period 1,April 1 - Sept 30
- Shut Down Cost for Period 2, October 1 - March 30
- Minimum Down Time, in hrs

(61) If a participant is not accepted in the Day Ahead Market and indicates that it wishes to be dispatchable in real time, the PJM dispatcher will use operational information provided during registration to dispatch the unit in real time.

(62) Participants shall send an email to PJM concurrent with or up to one hour immediately prior to beginning the reduction at loadresponse@pjm.com.

(63) Load reductions due to this program will not be eligible to set real time price on the PJM system unless metered directly by PJM.

(64) Participants shall send an email to PJM concurrent with or up to one hour immediately prior to the end of their load reduction at loadresponse@pjm.com. Alternatively, participants may indicate the length of their reduction within the email specifying the beginning of their reduction.

Metered Data

(65) For load reduction that is not metered directly by PJM participants are responsible for forwarding the appropriate meter data (as defined in the Program Documentation) to PJM within 60 days of the reduction. This data shall be forwarded to the following address in either CSV or Excel format: loadresponse@pjm.com.

(66) If the meter data files are not received within 60 days, no payment for participation is provided.

(67) Meter data must be provided for the hour prior to the reduction, as well as every hour during the reduction.

(68) Meter data will be forwarded to the EDC and LSE upon receipt, and these parties will then have ten (10) business days to provide feedback to PJM.

(69) All load reduction data are subject to PJM Market Monitoring Unit audit.

Customer Baseline Load (CBL)

(70) For those Participants in the PJM Economic Load Response program that wish to measure load reductions by comparing metered load against an estimate of what metered load would have been absent the reduction, a Customer Baseline Load (CBL) shall be calculated.

(71) The methodologies for calculating the Customer Baseline Load and the Weather Sensitivity Adjustment can be found in the PJM Economic Load Response Program Documents.

(72) A Customer Baseline Load cannot be calculated for the PJM Emergency Load Response Program

(73) A Customer Baseline Load is calculated for two timeframes: an Average Day CBL for Weekdays and the Average Day CBL for Weekends/Holidays.

(74) At the time it enters the Load Response Program, the end-use customer or its representative (LSE/CSP), shall specify whether it desires to apply a Weather Sensitivity Adjustment (WSA) for the summer period (May-October, inclusive) or the winter period (November-April) or both.

(75) The election to apply the WSA may be changed only annually.

(76) The WSA shall increase or decrease the CBL. The WSA shall be calculated for interval-metered end-use customers using a simplified methodology, including a regression analysis and analysis method, as defined in the Program Documentation. This simplified methodology only will be applicable for reductions in the real time Economic Program during the summer months when the hourly temperature at the nearest major airport equals or exceeds 85 degrees during each hour of the load reduction event and the WSA would make more than a five percent difference in the CBL that is calculated.

(77) The WSA, expressed in percentage terms, shall be applied to each hour of the CBL during the event period in order to establish a weather-adjusted CBL.

(78) For end-use customers without interval data from the previous summer that select the regression analysis, the WSA shall initially be set at 100%. After one month of actual program response, a regression analysis shall be performed and the WSA shall be adjusted.

(79) In no event shall application of the WSA produce a weather-adjusted CBL that exceeds the end-use customer's historical, seasonal, on-peak non-coincident peak load.

(80) Case-by-case suggestions for alternative WSA methods or adjustments to the end-use customer's historical, seasonal, on-peak non-coincident peak load may be approved by PJM for use in the Economic Load Response Program if negotiated in good faith and agreed to by all appropriate parties.

(81) Participants are responsible for forwarding the appropriate CBL data (as defined in the Program Documentation) to PJM within 60 days of the reduction. This data shall be forwarded to the following address in either CSV or Excel format: loadresponse@pjm.com.

(82) If the CBL data files are not received within 60 days, no payment for participation is provided.

(83) CBL data must be provided for each contiguous hour during which load reduction was accomplished.

(84) PJM will forward Customer Baseline (CBL) and Weather-Sensitive Adjustment (WSA) calculations to the appropriate EDC and LSE for optional review.

(85) EDC and LSE will provide feedback to PJM within ten (10) business days of receipt of data.

(86) The end-use customer shall inform PJM directly or inform its CSP/LSE, who shall inform PJM, of any significant change to the end-use customer's operations that increases or decreases the end-use customer's CBL.

(87) A significant incremental change is defined as any operational or physical change to the end-use customer's facilities that will adjust more than half the hours in the end-use customer's CBL by at least 20% for more than twenty consecutive days. PJM may require and approve such adjustments to the CBL as are necessary to reflect the significant incremental change.

(88) All CBL data are subject to PJM Market Monitoring Unit audit.

Settlements Data Requirements

(89) Data required for emergency load response settlements :

- Real time LMP values by Zone or aggregate (including nodal) (PNODE)
- Actual Metered Reduction (Hourly MW) by Market Participant and by Zone or aggregate (including nodal) (PNODE)
- Actual Load (Hourly MW) by Market Participant and by Zone or aggregate (including nodal) (PNODE)
- Market Participant acting as CSP (ParticipantName)

(90) Data required for day-ahead economic load response settlements :

- Day-ahead LMP values by Zone or aggregate (including nodal) (PNODE)
- Day-ahead load response scheduled MW quantities by Market Participant and by Zone or aggregate (including nodal) (PNODE)
- Real Time LMP values by Zone or aggregate (including nodal) (PNODE)
- Actual Metered Reduction (Hourly MW) by Market Participant and by Zone (PNODE)
- Actual Load (Hourly MW) by Market Participant and by Zone (PNODE)
- Load Serving Entity (LSEOrgId)
- Market Participant acting as CSP (ParticipantName)
- Loss Factor
- Retail Rate (G & T)

(91) Data required for real time economic load response settlements:

- Real time LMP values by Zone or aggregate (including nodal) (PNODE)
- Actual Metered Reduction (Hourly MW) by Market Participant and by Zone or aggregate (including nodal) (PNODE)
- Actual Load (Hourly MW) by Market Participant and by Zone or aggregate (including nodal) (PNODE)
- CBL (Hourly MW)
- Load Serving Entity (LSEOrgId)
- Market Participant acting as CSP (ParticipantName)
- Loss Factor
- Retail Rate (G & T)

(92) There are two Operating Reserve calculations, which require the following information:

- Day Ahead Operating Reserves
  - ShutDown Costs submitted biannually
- Balancing Operating Reserves
  - ShutDown Costs submitted biannually

PJM Load Response Programs – Business Rules

Revision #4: Revised November 4, 2005

Emergency Settlement

(93) Payment for reducing load is based on the actual MWh relief provided plus the adjustment for losses.

(94) The minimum duration of a load reduction request is two hours although the reduction request may be extended if necessary.

(95) The magnitude of relief provided could be less than, equal to, or greater than the MW amount declared on the Emergency Load Response Program Registration form.

(96) PJM pays the higher of the appropriate zonal or aggregate (including nodal) Locational Marginal Price (LMP) or $500/MWh to the PJM Member that nominates the load. Payment will be equal to the measured reduction adjusted for losses times the higher of the appropriate zonal Locational Marginal Price (LMP) or $500/MWh.

(97) The measured reduction can be either measured output of backup generation or the difference between the measured load the hour before the reduction and each hour during the reduction.

(98) During emergency conditions, costs for emergency purchases in excess of the LMP are allocated among PJM Market Buyers in proportion to their increase in net purchases from the PJM energy market during the hour in the real time market compared to the day-ahead market. Consistent with this pricing methodology, all charges under this program are allocated to purchasers of energy, in proportion to their increase in net purchases from the PJM energy market during the hour from day-ahead to real time.

Day-ahead Economic Load Response Settlement

(99) Day-ahead settlement is based on day-ahead hourly LMPs

(100) Reimbursement for reducing load is based on the reductions of MWh committed in the Day-Ahead Market.

(101) An end-use customer or its representative (LSE/CSP) that submits a load reduction bid in the Day-Ahead Market that is accepted by PJM when the day ahead LMP is greater than or equal to $75 MWh, will be paid by PJM the day ahead LMP

(102) An end-use customer or its representative (LSE/CSP) that submits a load reduction bid day ahead that is accepted by PJM when the day ahead LMP is less than $75 MWh will be paid by PJM the day ahead LMP less an amount equal to the applicable generation and transmission charges.

(103) The applicable generation and transmission charge is the charge the participant would have otherwise paid the LSE absent the load reduction.

(104) EDCs functioning as LSEs may use the average shopping credit for generation and transmission for a rate class.

PJM Load Response Programs – Business Rules

Revision #4: Revised November 4, 2005

(105) Total payments to end-use customers or their representatives (LSEs/CSPs) for accepted day-ahead load response bids will not be less than the total value of the load response bid, including any submitted shut down cost. Any shortfall will be made up through normal, day-ahead operating reserves.

(106) In all cases, the applicable zonal or aggregate (including nodal) LMP is used as appropriate for the individual end-use customer.

(107) Payments under the Economic Load Response Program will be made by PJM to the end-use customer or its representative (LSE/CSP).

(108) In the event the CSP or LSE is the party to be paid but is not the load reducer, the portion of the payment that will be transferred from the LSE/CSP to the end-use customer that actually reduced load is outside the scope of this program, and must be arranged between the LSE/CSP and the end-use customer.

(109) If the day-ahead LMP is less than $75/MWh PJM, shall recover day-ahead LMP less an amount equal to applicable generation and transmission charges from the LSE that otherwise would have the load that was reduced.

(110) If the day-ahead LMP is greater than or equal to $75/MWh, PJM shall recover an amount equal to applicable generation and transmission charges from all LSEs in the zone of the load reduction. PJM shall recover the remaining amount, LMP less an amount equal to the generation and transmission charges, from the LSE that otherwise would have the load that was reduced.

(111) If the total amount of recoverable charges reflecting the generation and transmission charges for the entire program exceeds $17.5 million in a year, thereafter participants will receive LMP less an amount equal to the applicable generation and transmission charges regardless of the level of LMP.

(112) End-use customers or their representatives (LSEs/CSPs) that have load reductions committed in the day-ahead market that cannot demonstrate hourly performance in real time equal to at least that of the day-ahead commitment will be charged real time LMP for the amount of the shortfall, plus any associated balancing operating reserve charges. LSEs that otherwise would have load that was reduced shall receive any associated operating reserve credits plus, if real-time LMP is higher than day-ahead LMP during the shortfall, the difference between day-ahead and real-time LMP times the shortfall.

(113) End-use customer or their representatives (LSEs/EDCs) that have load reductions committed in the day-ahead market and have hourly performance in real-time greater than that of the day ahead commitment will be credited for the additional load response according to the Real-time Economic Load Settlement Process.

(114) PJM Market Settlements produces bill and sends to Program Participant for payment as per rules defined in the Program Documentation.

Real Time Economic Load Response Settlement

(115) Real time settlement is based on real-time hourly integrated LMP.

(116) Reimbursement for reducing load is based on the actual MWh relief provided in excess of committed day-ahead load reductions plus the adjustment for losses if any.

(117) If the real time LMP is greater than or equal to $75/MWh, the end-use customer (or its representative (LSE/CSP)) that curtails load in real-time will be paid the real time LMP.

(118) If the real time LMP is less than $75/MWh, the end-use customer (or its representative (LSE/CSP)) that curtails load in real-time will be paid by PJM the real time LMP less an amount equal to the applicable generation and transmission charges.

(119) The applicable generation and transmission charge is the charge the end-use customer would have otherwise paid the LSE absent the load reduction.

(120) EDCs functioning as LSEs may use the average shopping credit for generation and transmission for a rate class

(121) In cases where the load response is dispatched by PJM, or the "strike" price of end-use customer with an LMP based contract is reached and such load response is dispatched by PJM, payment will not be less than the total value of the load response bid, including any submitted shutdown cost. Any shortfall will be made up through normal, balancing operating reserves.

(122) In all cases, the applicable zonal or aggregate (including nodal) LMP is used as appropriate for the individual end-use customer.

(123) An end-use customer or its representative (LSE/CSP) will accumulate credits for energy reductions in those hours when the energy delivered to the end-use customer is less than the end-use customer's CBL at the corresponding hourly rate.

(124) In the event the end-use customer's hourly energy consumption is greater than the CBL, then the end-use customer or its representative (LSE/CSP) will accumulate debits at the corresponding hourly rate for the amount the end-use customer's hourly energy consumption is greater than the CBL.

(125) In no event will the end-use customer's (or its representative's) credit be reduced below zero on a daily basis.

(126) Payments under the Economic Load Response Program will be made by PJM to the end-use customer or its representative (LSE/CSP).

(127) In the event the CSP or LSE is the party to be paid but is not the load reducer, the portion of the payment that will be transferred from the LSE/CSP to the end-use customer that actually reduced load is outside the scope of this program, and must be arranged between the LSE/CSP and the end-use customer.

(128) If the real-time LMP is less than $75/MWh, PJM shall recover real-time LMP less an amount equal to applicable generation and transmission charges from the LSE that otherwise would have the load that was reduced.

(129) If the day-ahead LMP is greater than or equal to $75/MWh, PJM shall recover an amount equal to applicable generation and transmission charges from all LSEs in the zone of the load reduction. PJM shall recover the remaining amount, LMP less an amount equal to the generation and transmission charges, from the LSE that otherwise would have the load that was reduced.

(130) If the total amount of recoverable charges reflecting generation and transmission charges for the entire program exceeds $17.5 million in a year, thereafter participants will receive LMP less an amount equal to the applicable generation and transmission charges regardless of the level of LMP.

(131) PJM Market Settlements produces bill and sends to Program Participant for payment as per rules defined in the Program Documentation.

Active Load Management Participation

(132) An ALM customer may participate in either PJM Load Response program during ALM events as long as the customer's ALM contract explicitly excludes payment or credit for energy not consumed during ALM events.

(133) If the LSE that submitted the customer for ALM credit indicates that the customer is not eligible for simultaneous credit under either PJM Load Response program and ALM is called for concurrent with either PJM Load Response program, then payments will be made to the end-use customer or representative according to either PJM Load Response program only for the time during which ALM obligations were not in effect.

(134) Any response in excess of the contracted ALM amount will be compensated under either PJM Load Response program for the entire duration of response

Reporting

(135) PJM Capacity Adequacy will add back actual load reductions from the Emergency Load Response Program for the purpose of peak load calculations for capacity. Reductions under the Economic Load Response Program will not be added back.

(136) PJM will submit to FERC any required reports on behalf of the Load Response Program Participants.

(137) PJM will post any FERC required reports and program related documentation on the PJM web site.

(138) PJM will prepare an annual status report of the program.

Revision #4: Revised November 4, 2005

(139) PJM will submit annual status report to the PJM Board of Managers, the Members Committee, the Reliability Committee, the Energy Market Committee, and the Operating Committee for review. PJM will file two reports evaluating the effectiveness of the program, one on May 31, 2003 and one on October 31, 2004.

PJM Primer
For
Municipalities and Cooperatives

PJM Load Response Program

February 2006

What is Load Response?

"Load response is a highly useful and beneficial tool to reduce costs and maintain reliability during peak periods when generation supplies may be scarce."

According to the April 30,2002 FERC Order

PJM Load Response Programs

EMERGENCY

Designed to provide a method by which end-use customers may be compensated by PJM for voluntarily reducing load during an emergency event.

ECONOMIC

Designed to provide an incentive to customers or curtailment service providers to reduce consumption when PJM LMP prices are high

Currently Registered MW of Load Reduction

PRICING ZONE	Economic Load Reduction (MW)	Emergency Load Reduction (MW)
AE	5.9	4
BGE	120.826	112.85
DPL	109.809	17.25
JCPL	38.222	3.3
METED	44.8	6.61
PECO	72.785	291.955
PENELEC	81.82	7.66
PEPCO DC	5.856	0.25
PEPCO MD	29.582	7.251
PPL	84.958	163.385
PSEG	42.393	30.63
APS	195.1	74.5
RECO	1	N/A
COMED	1074.464	856.335
AEP	164.5	N/A
DAY	N/A	N/A
DOM	78.5	N/A
DLCO	42.9	41.45
Motiva	18	N/A
UGI	N/A	0.32
Total	**2,211.415**	**1,617.746**

2005 Demand Side Response Monthly MWh Reductions

ZONE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
AE	16.6					2.3	2,336.1	1,122.8				
AEP						370.7	1,256.0	254.2				
APS	5,832.1					2,552.7	12,575.5	2,422.7	9,054.5	10,263.9	4,808.1	
BGE						650.1	1,762.6	3,748.1	885.8	373.0		
COMED							0.6	15.8	59.5	7.5		
DLCO								3,224.0				
DOM								348.0				
DPL	334.4		259.8	19.5		815.0	6,318.7	12,358.6	14,187.3	5,334.8		
JCPL						16.1	28.7					
METED	97.1	8.0	157.2	50.2		117.2	230.1	4.1	6.1			
PECO			2.3			300.0	484.1	362.6	75.4	133.8	18.8	
PENELEC								15.4	18.6			
PPL	29.9	632.5			1,538.7	2,354.3	192.6	157.4	307.9		1,129.1	
PSEG						63.0	350.9	320.4	286.8	123.8	204.3	
RECO								0.1	3.2			
UGI												
Total	6,310.0	640.5	419.3	69.7	1,538.7	7,241.4	25,535.9	24,354.2	24,885.3	16,236.8	6,160.4	**113,392.3**

2005 Demand Side Response
Monthly Number of Sites Reducing

ZONE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
AE	10					4	550	269			
AEP						72	192	33			
APS	429					208	743	392	992	789	260
BGE						751	770	726	309	138	
COMED							8	120	149	22	
DLCO								237			
DOM								22			
DPL	93		72	6		377	986	686	534	467	
JCPL						8	13				
METED	123	12	284	48		192	474	16	34		
PECO			14			246	686	326	111	66	28
PENELEC								13	16		
PPL	7	87			94	114	220	190	75		73
PSEG						10	570	430	387	97	358
RECO								3	42		
UGI											
Total	662	99	370	54	94	1982	5212	3463	2649	1579	719

2005 Demand Side Response
Monthly Net CSP Credits

ZONE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
AE	$1,315.72					$373.33	$202,528.53	$99,852.25				
AEP						$13,547.85	$62,126.47	$28,931.43				
APS	$230,430.52					$168,361.55	$681,721.56	$271,529.55	$846,664.75	$785,627.18	$304,625.99	
BGE						$94,965.62	$403,816.47	$642,295.65	$101,365.66	$30,533.16		
COMED							$82.21	$2,135.47	$2,891.64	$500.42		
DLCO								$159,837.61				
DOM								$35,451.81				
DPL	$35,958.79		$22,058.22	$927.35		$20,969.96	$837,361.67	$1,807,762.55	$1,818,133.18	$661,427.45		
JCPL						$2,393.32	$6,783.61					
METED	$2,584.96	$293.18	$5,356.89	$1,647.12		$9,215.18	$15,733.64	$531.12	$1,195.56			
PECO			$202.94			$40,538.76	$90,659.27	$62,378.63	$11,409.88	$18,723.15	$1,071.76	
PENELEC								$1,502.98	$2,192.45			
PPL	$223.50	$13,095.43			$54,665.60	$173,404.67	$17,581.89	$24,523.86	$39,409.75		$79,063.36	
PSEG						$464.47	$48,892.84	$47,662.46	$45,456.60	$17,051.65	$19,330.87	
RECO								$17.61	$308.45			
UGI												
Total	$270,513.49	$13,388.61	$27,618.05	$2,574.47	$54,665.60	$524,234.72	$2,367,288.15	$3,184,412.98	$2,869,027.91	$1,513,863.01	$404,091.97	**$11,231,678.96**

2004 and 2005 Total MWh Reductions and Total CSP Credits

Year	MWh of Reductions	Settled CSP Credits
2004	57,626	$1,897,499.05
2005	113,392	$11,231,678.96
Percent Difference over 2004	96.8%	491.9%

Comparison of Revenue Opportunities for Demand Response Current vs. Revised

Revenue Opportunity	PJM (today)	PJM with new initiatives
Real-Time/Spot Energy Sales	Yes	Yes
Day-Ahead Energy Sales	Yes	Yes
Forward Energy Sales	[redacted]	Yes; Forward Energy Reserve Market
Forward Capacity Sales	Yes, but limited	Yes; RPM auction fixes small volume issue
Energy & Capacity payment for emergencies	[redacted]	Yes; Emergency program changes ensure payment
Ancillary Services	[redacted]	Yes; Spin & Regulation

Who Offers Load Response Programs?

- *Utility Sponsored*
- *Curtailment Service Provider Sponsored*
- *Load Serving Entity Sponsored*
- *Independent System Operator Sponsored*

Roles of PJM Market Participants

Load Serving Entity:

PJM Member, including Load aggregator or power marketer, serving end-users within the PJM Control Area, to sell electric energy to end-users with the PJM Control Areas.

Generator:

PJM Member that owns, or leases, facilities for generation of electric energy that are located within the PJM Control Areas.

End Use Customer

Curtailment Service Provider:

PJM Members that will act on behalf of end-use customers who wish to participate in the PJM Load Response Programs.

Electric Distribution Company :

PJM Member that owns, or leases, electric distribution facilities that are used to provide electric distribution service to electric load within the PJM Control Areas.

Options to Participate

EMERGENCY

PJM Emergency event

- PJM sends notification
- Voluntary Curtailment

ECONOMIC**

Day Ahead Market

- Customer Submit Day Ahead Bid in eMKT
- PJM Notifies Customer via eMKT
- Obligated in Real Time if Bid clears

Real Time Market

- Customer Notifies PJM via email one hour prior to reduction
- Voluntary Curtailment

Dispatched by PJM in Real Time

- Customer Submits operational info via eSuites
- PJM Notifies Customer via phone

***Except Real Time LMP Based Customer*

Payment to Load Reducers

EMERGENCY

PJM pays higher of Zonal LMP or $500/MWh

ECONOMIC **

If Zonal LMP < $75/MWh,

- PJM pays Zonal LMP - Retail Rate (Retail Rate = Generation + Transmission)

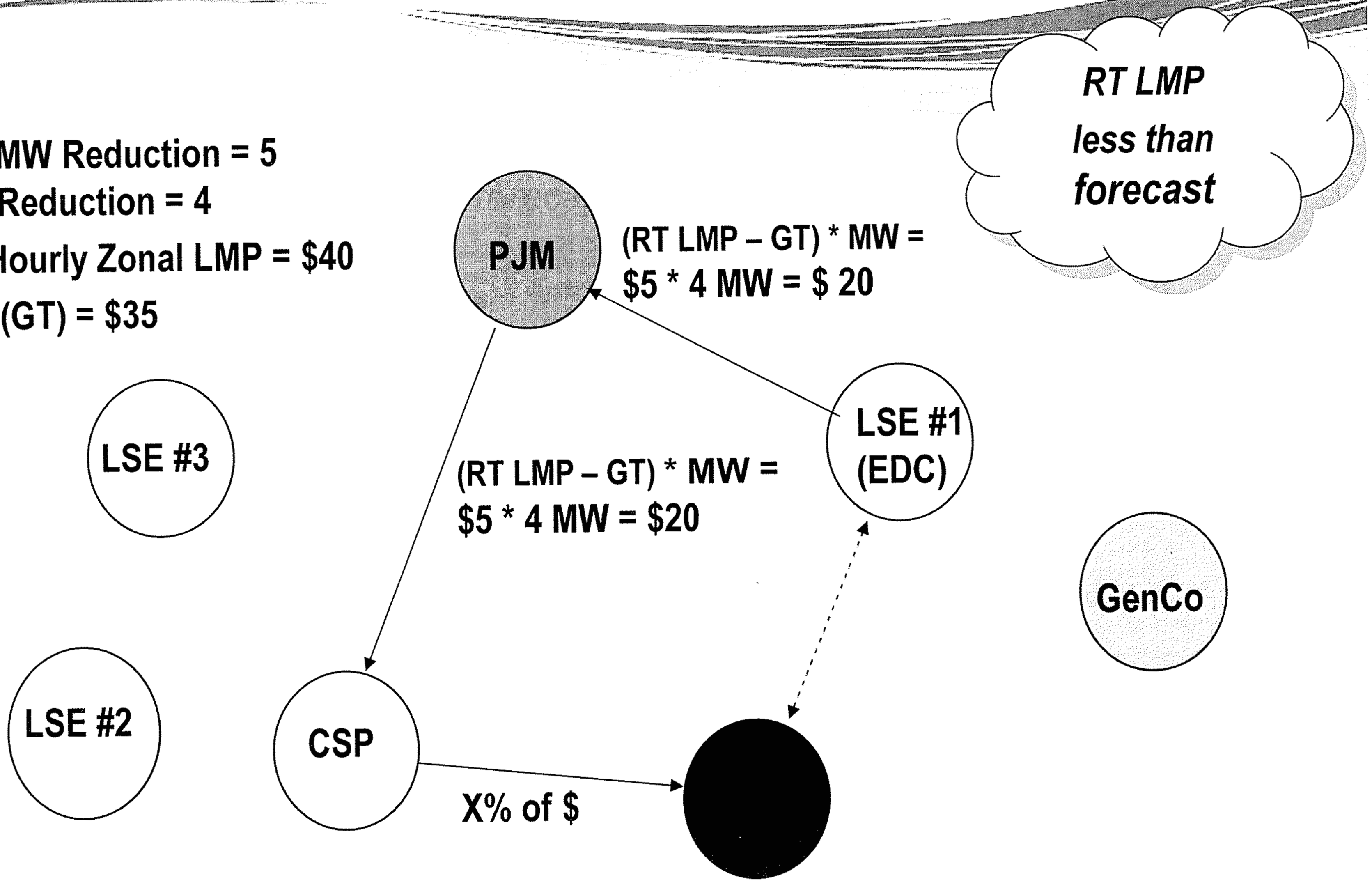
If Zonal LMP > = $75/MWh,

- PJM pays Zonal LMP

***Except Real Time LMP Based Customer*

DrugCo Site # 1 – Real Time Load Curtailment

Hour 12
Scheduled MW Reduction = 5
Actual MW Reduction = 4
Real Time Hourly Zonal LMP = $40
Retail Rate (GT) = $35



DrugCo Site # 1–Dispatched by PJM in Real Time

- **Shutdown Costs = $1,500**
- **Minimum Down Time = 6 Hours**
- **MW Reduction = 5 MW**
- **Retail Rate (G&T) = $35 /MWh**

Imagine If.....
Customer wants to be Dispatched by PJM

Example:

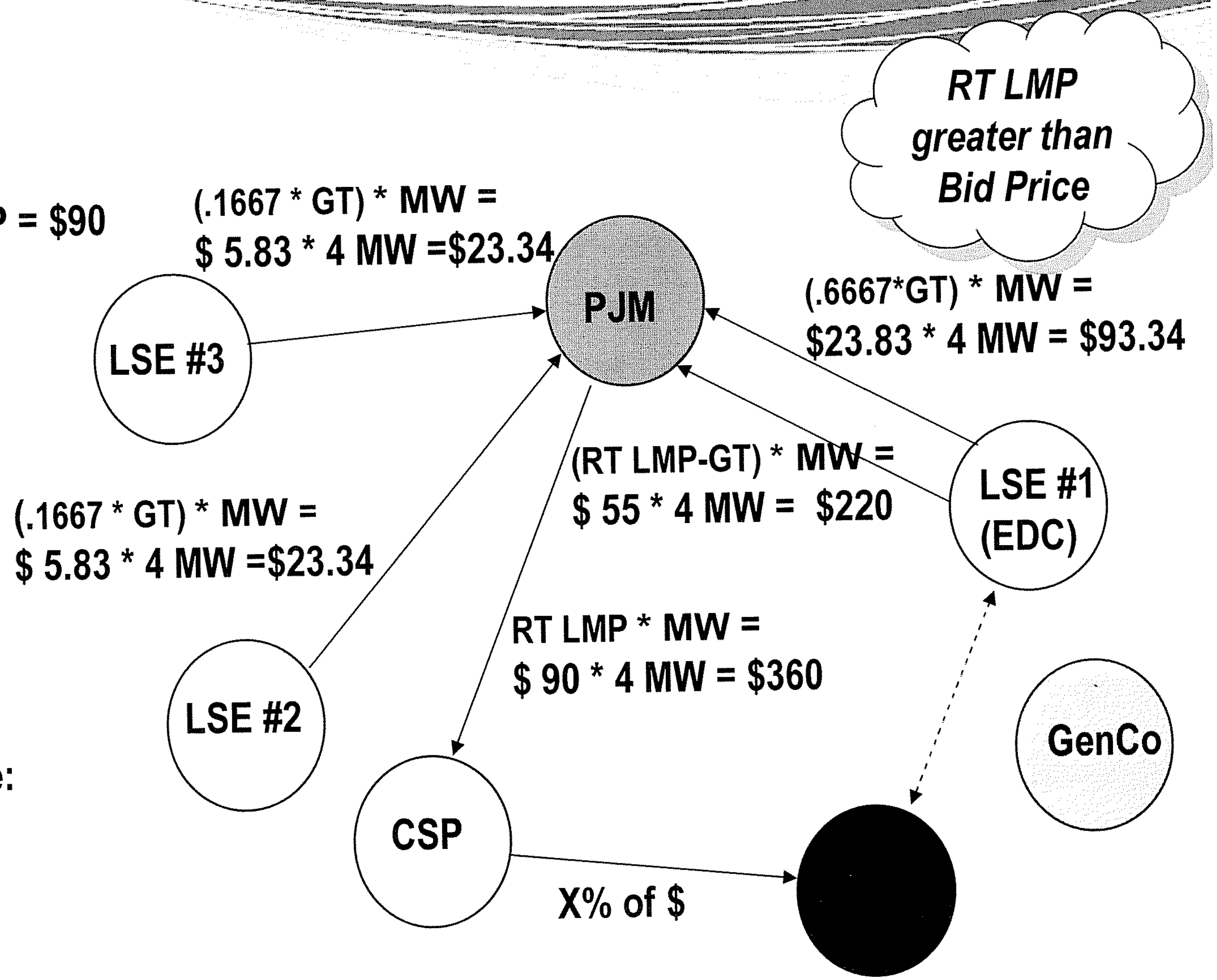
$$\left(\frac{\$\,1{,}500}{6\text{ Hours}} * \frac{1}{5\text{ MW}} \right) + \$\,35\text{ /MWh} = \$85.00$$

<u>Action</u>

- ***Customer Decides to allow PJM to Dispatch in Real Time***
- ***Customer submits operational info to PJM (Bid Price ($87) > Marginal Cost)***
- ***<u>PJM</u> Forecasts Real Time LMP > $87.00 Hours 12 – 18***
- ***<u>PJM</u> dispatches load reduction***

DrugCo Site # 1–Dispatched by PJM in Real Time

<u>Hour 12</u>
Bid Price = $87.00
Bid Quantity (MW) = 5
Real Time Hourly Zonal LMP = $90
Actual MW Reduction = 4
Retail Rate (GT) = $35



Load Ratio Shares w/in zone:
- LSE #1: 66.67%
- LSE #2: 16.67%
- LSE #3: 16.67%

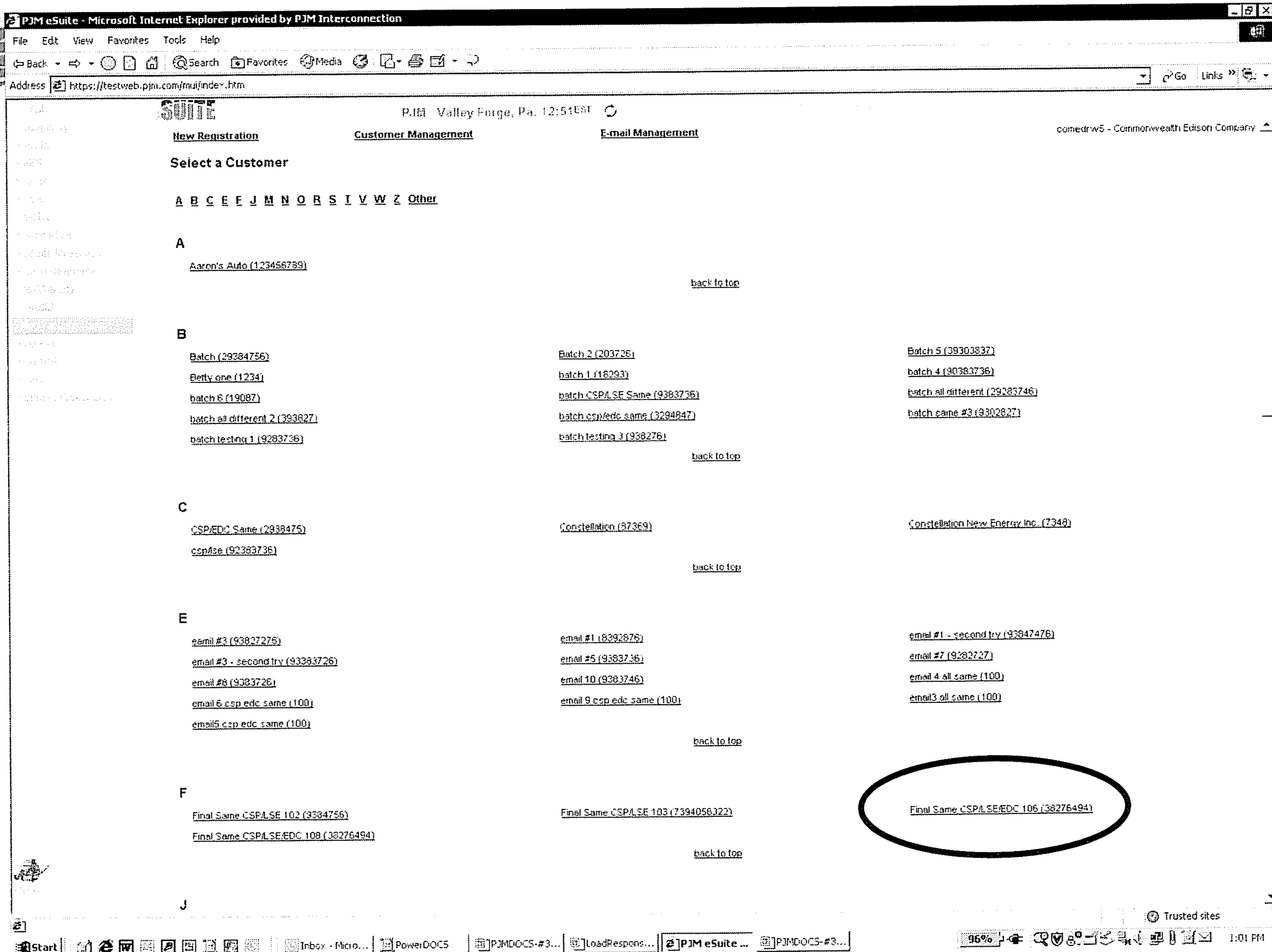
Payments, Costs, & Risks

Program	Participation	Payment to Load Reducer	Cost to Energy Market	Risks to Load Reducer
Emergency	**Emergency Event**	PJM pays higher of Zonal LMP or $500/MWh	Costs recovered for emergency purchases in excess of LMP are allocated among PJM Market Buyers in proportion to their increase in net purchases	**No Charges for Non Performance**
Economic	**Day Ahead Market** **Real Time Market** **Dispatched By PJM**	**If Zonal LMP < $75/MWh,** PJM pays LMP - Retail Rate [Retail Rate = Generation + Transmission] **If Zonal LMP > = $75/MWh,** PJM pays LMP	**If Zonal LMP < $75/MWh,** PJM recovers LMP less Retail Rate from LSE **If Zonal LMP > = $75/MWh,** PJM recovers LMP less Retail Rate from LSE PJM recovers Retail Rate from all LSEs in zone	**Charges for Non Performance:** If load reduction is committed in Day Ahead Market and does not perform in Real Time **Real Time LMP * Shortfall** **+** **Balancing Operating Reserves Charges**
Economic – Real Time LMP Based Customers	**Real Time Market Only** ***Must be dispatched by PJM***	***For duration of the load reduction dispatched by PJM,*** **Actual Savings** [RT LMP * MW Reduction] **-** **Total Bid Value** [(Strike Price * MW Reduction) + Shutdown Costs]	Costs recovered from Operating Reserves in the Real-Time Energy Market	**No Charges for Non Performance**

New User Interfaces for Demand Response

- Curtailment Service Provider (CSP) Home Page
- Registration
- Settlement
- Real Time Load Reduction Notification

Home


PJM eSuite - Microsoft Internet Explorer provided by PJM Interconnection
File Edit View Favorites Tools Help
Back Search Favorites Media
Address https://testweb.pjm.com/mui/index.htm
Go Links
SUITE
PJM Valley Forge, Pa. 12:51EST
New Registration
Customer Management
E-mail Management
comedrw5 - Commonwealth Edison Company
Select a Customer
A B C E F J M N O R S T V W Z Other
A
Aaron's Auto (123456789)
back to top
B
Batch (29384756)
Betty one (1234)
batch 6 (19087)
batch all different 2 (393827)
batch testing 1 (9283736)
Batch 2 (203726)
batch 1 (18293)
batch CSP/LSE Same (9383736)
batch csp/edc same (3294847)
batch testing 3 (938276)
Batch 5 (39303837)
batch 4 (30383736)
batch all different (29283746)
batch same #3 (9302827)
back to top
C
CSP/EDC Same (2938475)
csp/lse (92383736)
Constellation (87369)
Constellation New Energy Inc. (7348)
back to top
E
eemil #3 (93827275)
email #3 - second try (93383726)
email #8 (9383726)
email 6 csp edc same (100)
email5 csp edc same (100)
email #1 (8392876)
email #5 (9383736)
email 10 (9383746)
email 9 csp edc same (100)
email #1 - second try (93847476)
email #7 (9282727)
email 4 all same (100)
email3 all same (100)
back to top
F
Final Same CSP/LSE 102 (3384756)
Final Same CSP/LSE/EDC 108 (38276494)
Final Same CSP/LSE 103 (7394058322)
Final Same CSP/LSE/EDC 106 (38276494)
back to top
J
Trusted sites
Start
Inbox - Micro...
PowerDOCS
PJMDOCS-#3...
LoadRespons...
PJM eSuite ...
PJMDOCS-#3...
96%
1:01 PM

Registration

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File Edit View Favorites Tools Help

Address https://testweb.pjm.com/mui/index.htm

Links Development Product Test Stage Training Production ServiceCenter ETS EMT eSuite Health PJM Portal Load Response (Test) Load Response (Local)

SUITE PJM - Valley Forge, Pa. 10:36 EST

Home | Customer Management | New Registration | E-mail Management

comedrw5 - Commonwealth Edison Company

Load Response Registration

Registration ID:	R1855				
Curtailment Service Provider:	Commonwealth Edison Company	**Registration Status:**	Pending EDC/LSE	**Planning Period:**	2005-2006
Submitted Date:	02/02/2006	**Effective Date:**		**Terminate Date:**	06/01/2006

Customer Data

End Use Customer Name: Walmart - Trooper PA
EDC Account Number: 01-KR9580-H2
End Use Customer Zip Code: 19403
Zone: PPL
Aggregate:
Program Option: Economic
Metering Requirement: Cust Meter-read by Cust

Contract Information

Customer Energy Supplier (LSE): Conectiv Energy Supply, Inc.
Contract Type: Other
Retail rate (G&T): cents/kWh
Description: Seasonal rates.

Reduction Detail

Peak Hourly Load: 2000 kW
Load Reduction: 1000 kW
Load Reduction Method: Load Drop
Loss Factor: 1.09312 i.e. 1.09300

Real-time Resource Detail

ALM Participant: Yes / No (No selected)
Strike Price: 50.0 $/MW
Time to Reduce: 20 Minutes
Backup Generation: Yes / No (No selected)
Type of Generation:
Amount kW
Fuel Type
Dispatchable in Real Time: Yes / No (No selected)
Shutdown Costs:
Apr. 1 - Sep. 30:
Oct. 1 - Mar. 31:
Minimum Downtime: Hours
Weather Sensitive: Yes / No (No selected)
Weather Station:

Comments (optional)

Take Action
Withdraw

Condition
Hold
Dispute

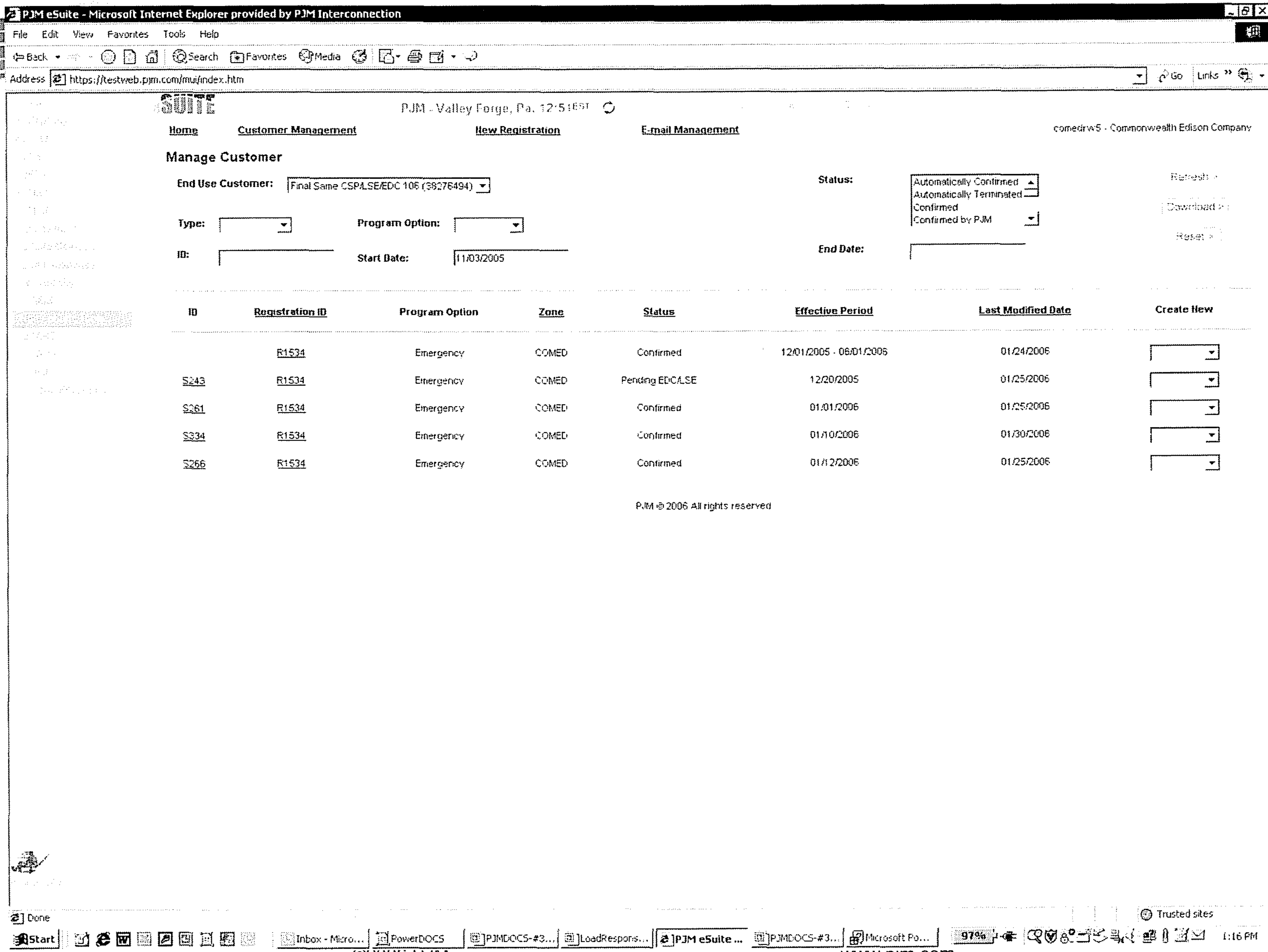
Submit Registration » Copy Registration »

Status History

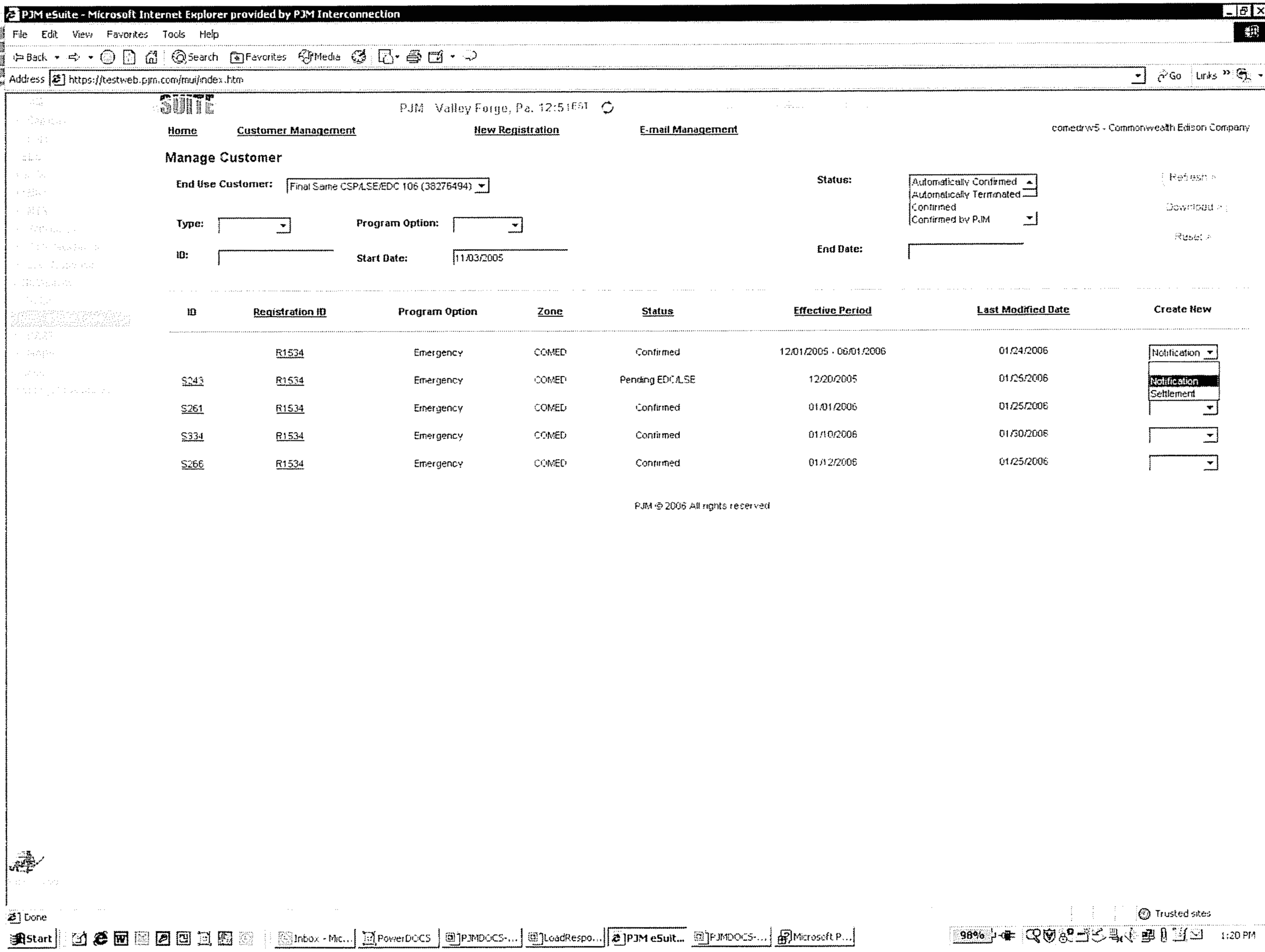
User's Name	Status Change	Timestamp	Comments
comedrw5	Pending EDC/LSE	02/02/2006 10:42:50 EST	New site registered in January

Done Trusted sites

Customer Management



Notifications



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Address https://testweb.pjm.com/mui/index.htm

PJM Valley Forge, Pa. 12:51

Home | Customer Management | New Registration | E-mail Management

comedrw5 - Commonwealth Edison Company

Manage Customer

End Use Customer: Final Same CSP/LSE/EDC 106 (38276494)

Status: Automatically Confirmed / Automatically Terminated / Confirmed / Confirmed by PJM

Type:

Program Option:

ID:

Start Date: 11/03/2005

End Date:

Refresh

Download

Reset

ID	Registration ID	Program Option	Zone	Status	Effective Period	Last Modified Date	Create New
	R1534	Emergency	COMED	Confirmed	12/01/2005 - 06/01/2006	01/24/2006	Notification
S243	R1534	Emergency	COMED	Pending EDC/LSE	12/20/2005	01/25/2006	Notification / Settlement
S261	R1534	Emergency	COMED	Confirmed	01/01/2006	01/25/2006	
S334	R1534	Emergency	COMED	Confirmed	01/10/2006	01/30/2006	
S266	R1534	Emergency	COMED	Confirmed	01/12/2006	01/25/2006	

Notifications

PJM eSuite - Microsoft Internet Explorer provided by PJM Interconnection

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Address https://testweb.pjm.com/mui/index.htm

PJM · Valley Forge, Pa. 12:51 EST

Home | Customer Management | New Registration | New Notification | New Settlement Data | E-mail Management

comedrw5 - Commonwealth Edison Company

Real-Time Economic Load Response Notification

Registration ID:	R1534	**Notification ID:**	
End Use Customer Name:	Final Same CSP/LSE/EDC 106	**Submitted Date:**	
EDC Account Number:	38276494	**Last Modified Date:**	
Zone:	COMED		
Company:	Commonwealth Edison Company		
*** Date of Curtailment:**	02/01/2006		
*** Start Time (Hour Ending):**	01		
*** End Time (Hour Ending):**	02		
*** Load Reduction (kW):**	1000		

* Required Information

Submit

Done | Trusted sites

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Settlement

PJM eSuite - Microsoft Internet Explorer provided by PJM Interconnection

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Address https://testweb.pjm.com/mui/index.htm

PJM · Valley Forge, Pa. 14:14EST

Home | Customer Management | New Registration | E-mail Management

comedrw5 - Commonwealth Edison Company

Manage Customer

End Use Customer: Final Same CSP/LSE/EDC 106 (38276494)

Status: Automatically Confirmed / Automatically Terminated / Confirmed / Confirmed by PJM

Type:

Program Option:

ID:

Start Date: 11/03/2005

End Date:

Refresh »

Download »

Reset »

ID	Registration ID	Program Option	Zone	Status	Effective Period	Last Modified Date	Create New
	R1534	Emergency	COMED	Confirmed	12/01/2005 - 06/01/2006	01/24/2006	Settlement
S243	R1534	Emergency	COMED	Pending EDC/LSE	12/20/2005	01/25/2006	Notification / Settlement
S261	R1534	Emergency	COMED	Confirmed	01/01/2006	01/25/2006	
S334	R1534	Emergency	COMED	Confirmed	01/10/2006	01/30/2006	
S266	R1534	Emergency	COMED	Confirmed	01/12/2006	01/25/2006	

Done | Trusted sites

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Settlement

PJM eSuite - Microsoft Internet Explorer provided by PJM Interconnection

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Address https://testweb.pjm.com/mui/index.htm

eSUITE PJM · Valley Forge, Pa. 14:14EST

Home | Customer Management | New Registration | New Notification | New Settlement Data | E-mail Management

comedrw5 - Commonwealth Edison Company

Settlement Data

Curtailment Service Provider:	Commonwealth Edison Company	**End Use Customer Name:**	Final Same CSP/LSE/EDC 106	**EDC Account Number:**	38276494	**Program Type:**	Emergency
Settlement ID:		**Registration ID:**	R1534	**Zone:**	COMED	**Contract Type Description:**	This is a sample contract description
Settlement Status:	New	**Settlement Date:**		**Load Reduction Method:**	Load Drop		

Hour Ending	CBL or Generation (kWh)	Metered Load (kWh)	Reduction (kWh)	Retail Rate (cents/kWh)	Loss Factor	Hour Ending	CBL or Generation (kWh)	Metered Load (kWh)	Reduction (kWh)	Retail Rate (cents/kWh)	Loss Factor
1					1.09873	13					1.09873
2					1.09873	14					1.09873
3					1.09873	15					1.09873
4					1.09873	16					1.09873
5					1.09873	17					1.09873
6					1.09873	18					1.09873
7					1.09873	19					1.09873
8					1.09873	20					1.09873
9					1.09873	21					1.09873
10					1.09873	22					1.09873
11					1.09873	23					1.09873
12					1.09873	24					1.09873

Comments (optional)

Submit >

Done | Trusted sites

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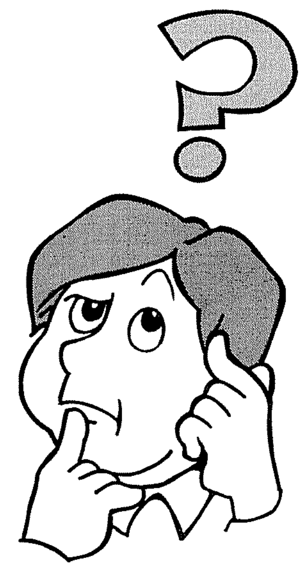
Questions??



PJM Load Response Program

PJM Load Response Programs – Business Rules

Revision #4: Revised November 4, 2005

Program Summary

(1) The PJM Emergency Load Response Program will enable participants that reduce load during emergency conditions to receive payment for those reductions.

(2) The PJM Economic Load Response Program is designed to provide an incentive to customers or curtailment service providers to enhance the ability and opportunity for customers to reduce consumption when PJM LMP prices are high.

- The **Day Ahead Option of the Program** will provide a mechanism by which any qualified market participant may offer customers the opportunity to reduce the load they draw from the PJM system in advance of real time operations and receive payments based on day ahead time LMP for the reductions.
- The **Real Time Option of the Program** will provide a mechanism by which any qualified market participant may offer customers the opportunity to commit to a reduction of the load they draw from the PJM system during times of high prices and receive payments based on real time LMP for the reductions.

PJM Membership

(3) PJM Membership is required for participation in the PJM Load Response Programs. A special category of PJM membership is offered for participation in the Emergency Load Response Program, while full PJM membership is required for participation in the Economic Load Response Program. Special membership provisions have been established for certain program participants of the Economic Load Response program as detailed in Business Rule #6.

(4) If an organization is NOT a PJM member and would like to participate in the Emergency Load Response Program, that organization needs to apply for SPECIAL PJM membership for the purpose of participating in the Emergency Load Response Program.

(5) If an organization acquired special PJM membership for the 2001 Emergency Load Response Program and would like to participate in the Emergency Load Response Program, that organization needs to re-apply for special PJM membership for the purpose of participating in the Emergency Load Response Program.

(6) If an organization is NOT a PJM member and would like to participate in the Economic Load Response Program, that organization needs to apply for PJM membership. Special membership provisions have been established for certain program participants. For special members, the $1500 application fee and liability for Member defaults are waived, along with the following modifications:

- Special members shall pay an annual membership fee of $500 plus 10% of each payment owed by PJM for a load reduction event up to a total of $5,000 in a