**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

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| Wholesale Competition in Regions with Organized Electric Markets | ) ) | Dockets No. RM07-19-000 and AD07-7-000 |

# REPORT ON DEMAND RESPONSE

**OF POTOMAC ECONOMICS, LTD.**
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**NEW YORK ISO**

Potomac Economics, Ltd. ("Potomac Economics") submits these comments in response to the Federal Energy Regulatory Commission's ("FERC" or "Commission") Order 719, issued on October 17, 2008 in the above captioned proceeding.

## I. Communications

The name, title, and address of the person to whom to whom communications concerning this filing are to be addressed is as follows:

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## II. Background

In this proceeding, the Commission has proposed to amend its regulations under the Federal Power Act in a manner intended to improve the operation of organized wholesale electricity markets. The Commission issued a Final Rule in Order 719 on October 17, 2008 that

addresses these important issues.[1] In Order 719, the Commission identifies issues and improvements to specific aspects of organized wholesale markets in the areas of: (1) demand response and market pricing during a period of operating reserve shortage; (2) long-term power contracting; (3) market-monitoring policies; and (4) the responsiveness of regional transmission organizations (RTOs) and independent system operators (ISOs) to stakeholders and customers.

In Order 719, the FERC adopted the requirement that each RTO or ISO assess and report on any remaining barriers to comparable treatment of demand response resources to submit its findings and any proposed solutions, along with a timeline for implementation. The Commission indicated that RTOs and ISOs have a duty to remove unreasonable barriers to treating demand response resources comparably with other resources. The required report is intended to help the ISOs and the Commission identify and address such barriers. The report should identify all known barriers, and provide an in-depth analysis of those that are practical to analyze in the compliance time frame given and a time frame for analyzing the remainder. The FERC additionally points out that this should include (but is not limited to) technical requirements as well as performance verification limitations. Finally, the FERC leaves to each region/RTO the means of developing its report.

Order 719 also requires market monitors to provide its views on barriers to comparable treatment of demand response resources in RTO and ISO markets.[2] In compliance with this requirement, Potomac Economics submits this report as the Independent Market Advisor for the New York ISO.

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1 125 FERC ¶ 61,071 Wholesale Competition in Regions with Organized Electric Markets, Final Rule, Order 719.

2 Id., paragraph 274.

## III. Benefits and Types of Demand Response

### A. Benefits of Demand Response

Demand Response (DR) is comprised of actions that can reduce consumption during certain hours from normal consumption patterns. Demand participation in the market is beneficial in many ways. It contributes to reliability in the short-term, resource adequacy in the long-term, reduces price volatility and other market costs, and mitigates supplier market power. Additionally, price-responsive demand has great potential to enhance wholesale market efficiency.

Even modest reductions in consumption by end-users during high-price periods can significantly reduce the costs of committing and dispatching generation to satisfy the needs of the system. These benefits underscore the need to design wholesale markets that provide transparent economic signals and market processes that facilitate demand response. The comments in this paper are focused on several of the barriers to price-responsive demand response and the ISO's plans to address these barriers.

### B. Categories of Demand Response

Demand Response resources can be classified into two broad categories: emergency demand response and economic demand response. Emergency demand response resources are callable by the ISO in advance of a forecasted system emergency and thus can play an important role in supporting system reliability. However, emergency demand response does not participate in the energy market and is not generally price-responsive. Economic demand response resources respond to energy market prices, not only during emergencies but any time the energy prices exceed the marginal value of the consumer's electricity consumption. Economic demand response can usefully be subdivided into two groups – those that can be dispatched in the same

operational timeframes as generation (5 to 15 minutes) and those that must be notified in advance of when it is needed. This latter class of economic demand response resources generally require notification as short as one hour in advance to as long as 12 hours.

The real time market is significantly more volatile than the day-ahead market due to physical restrictions and random outages/contingencies that affect the real-time market. Given the relatively high value of most electricity consumption, demand response resources will tend to be most valuable in the real time during periods of shortage when prices rise sharply. In the day-ahead market where prices are less volatile and there are a much wider array of supply and demand alternatives, demand response resources are generally less valuable. On a longer-term basis, however, consumers can make strategic shifts in their consumption patterns in response to day-ahead prices (from peak to off-peak periods) that increases overall efficiency and reliability of the system (i.e., long-term demand response). Long-term demand response can profitably respond to day-ahead price signals.

## IV. Barriers to Demand Response

This sections describes generic barriers that can limit the development of the demand side of the wholesale electricity market. To a large extent, demand response programs that are implemented by RTOs and ISOs are designed to address these barriers.

### A. Regulatory Barrier -- Retail Prices are not Dynamic

Electricity industry restructuring has resulted in a hybrid market structure with a competitive wholesale market and a retail market that retains many characteristics of a regulated market. Linking retail rates to real-time wholesale market energy prices would encourage price-responsiveness by retail customers. This is often referred to as dynamic real-time pricing. However, retail load is largely served by Load Serving Entities (LSEs) that charge retail prices

that are unrelated to real-time prices in the NYISO market. Hence, most retail loads have no incentive to respond to real-time prices even when they exceed their marginal value of consumption. Dynamic retail pricing would generally require retail regulatory reform, as well as enabling infrastructure to measure and control real time load. Until those steps are taken, the fact that most retail loads pay prices that are unaffected by the short-term fluctuations in wholesale prices serves as a barrier to demand response because it removes the incentive for the load to respond.

### B. Responsiveness of Demand Response Resources

Some demand response resources consist of controllable load or "behind the meter generators" that can be dispatched on a five to fifteen minute basis that is comparable to generation.[3] These types of resources are generally the easiest to integrate. Unfortunately, this type of resource constitutes a relatively small share of all potential economic demand response resources, most of which must be notified well in advance and require a high degree of coordination between the demand response resources and the ISO. Nonetheless, the ISOs should provide incentive for suppliers of demand response to become increasingly responsive so that they can actively participate in the market in a manner that is comparable to generation.

Until significant changes are made, incorporating most demand response resources requires new rules and processes that accommodate the resources' inflexibility. These rules and processes include specialized settlement provisions since most resources in the real-time market are dispatched on a 5 to 15 minute basis and settle based on the real-time prices. To the extent that these procedures and programs do not exist, it can serve as a barrier to demand response.

[3] For environmental reasons, some have argued that behind the meter generators, which are often diesel-fired generators, should not be eligible to participate in economic demand response programs.

In New York, Emergency Demand Response Program (EDRP) and Special Case Resources (SCRs), for example, are not dispatchable by the real-time model on a five-minute basis. Therefore, they must be called in advance by the ISO based on projections of operating conditions. In general, this process increases costs to the ISO.

### C. Metering, Communication, and Baseline Issues

To accommodate the characteristics and requirements of most demand response resources, ISOs generally need specialized procedures to quantify the amount of the response and settlement rules to compensate the participant efficiently. These programs usually depend on the ISO to estimate what customers' demands would have been had they not reduced consumption as demand response resources. This estimated amount is often called a customer's baseline consumption. Measuring the baseline would be relatively straightforward if retail customers had interval recorders meters that provided data on the customers' instantaneous real-time consumption. Unfortunately, this is not the case for most retail customers, with the exception of some commercial and industrial customers. In the absence of such meters, establishing a customer baseline that accurately compensates demand response resources for actual load reductions can be challenging. Even with the availability of actual meter data, the design of a customer baseline must carefully consider the service being provided and factors that influence the results to avoid introducing opportunities for manipulation of the baseline calculations to garner larger payments under ISO's demand response programs.[4]

In addition to advanced metering, demand response in the electricity sector is facilitated by other enabling infrastructure, including communications and control devices. While larger

[4] One such example is the ISO New England's Day-Ahead Load Response Program. The ISO made a filing recently to address a concern that customers could artificially inflate their baseline and receive payments for taking no actions to actually reduce load.

industrial customers may have such metering and other devices, the penetration of these devices is limited among other retail customers. Because such infrastructure will facilitate an active demand side of the market, the lack of this infrastructure serves as a barrier currently that must be addressed. NYISO is supportive of SmartGrid upgrades that would address this barrier.

However, applying the same metering standards to demand response resources as to generators can serve as an additional barrier. For example, the one-minute interval metering requirement in PJM's synchronized reserves market would exclude most loads since most advanced meters are hourly or quarter-hourly. However, it should be recognized that many of these requirements, although they may be difficult for a demand resource to satisfy, are needed to verify that the demand resources is actually providing the service the ISO is procuring.

As an alternative to metering, statistical methods can be used to measure the performance of demand response resources that are under direct load control by the ISO, utility, or Curtailment Service Provider (CSP).[5] The adequacy of these types of measures depends on the service being provided and the ISO's performance requirements.

### D. Market Power Mitigation

One final potential barrier to demand response could be uncertainty regarding the application of market power mitigation. If a demand response resource is concerned that it will be accused of raising prices anticompetitively if it chooses to consume power when prices are high (as all non-responsive loads do), then it can serve as a disincentive or barrier to participation in demand response programs.

[5] Curtailment Service Providers (CSPs) serve as a demand response interface between the New York ISO and retail consumers.

Potomac Economics has generally advocated exempting demand response resources from market power mitigation measures. Given the relatively small magnitude of curtailment being offered by most demand response resources, they generally do not pose significant competitive concerns. In addition, determining the marginal value of consumption that would be the benchmark against which a demand response resources bid price would need to be evaluated is nearly impossible.

Finally, we reiterate that a demand response resource that offers to curtail at a very high price is still providing more flexibility and improving the competitiveness of the market versus being non-responsive. Non-responsive load, which constitutes the vast majority of load in the RTO markets, is equivalent to a demand response resources' offering to curtail at a price of infinity. Considered in this manner, it is clear that any bid price by a demand response resource is more competitive than being unresponsive.

### E. Shortage Pricing and Demand Response Setting Prices

One of the most important incentives for the development of demand response is an efficient wholesale price when the system is in shortage or demand response is clearing the market. Inadequate or inefficient price signals in these periods can be an important barrier to demand response because the full value of potential demand response is not captured by the resource. We discuss shortage pricing in detail in our accompanying report and address demand response setting prices in this subsection.

Economic demand response, *i.e.*, that which is called based on bids into the energy market, generally only sets energy prices if it is fully integrated into the ISO's market software and is dispatchable on a 5 to 15 minute basis. Demand response resources can set prices in the day-ahead market, although little demand response participates in the day-ahead market. Most

demand response participates in the real-time market, where the conditions for being eligible to set the market price pose a substantial barrier. Without specific ad hoc pricing provisions, the real-time ISO market prices will not be set by resources that are not dispatchable, including demand response resources.

When demand response resources do not set prices, a key component of the economic signals needed to support investment in new demand response resources and other resources will be missing, which is a substantial economic barrier to the development of demand response. Hence, it should be a high priority to make appropriate changes to allow both emergency and economic demand response resources to set energy and ancillary services prices at efficient levels when they are implemented.

## V. ISO Demand Response Programs

### A. Inter-ISO Comparison of Demand Response Programs

In this section, we provide a comparison of the Demand Response programs being held by the Midwest ISO, NYISO and ISO-NE followed by a more detailed description of the NYISO's programs and how they address the barriers discussed above. Table 1 below provides a snapshot of the Demand Response programs for each RTO.

**Table 1: Demand Response Participation in ISO Markets**

| | ISO-NE | | | | | NYISO | | | | MISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | RT DRP | RT PRP | RT PrRP | DA LRP | DP | EDRP | SCR | DA DRP | DS ASP | EDR | DP |
| RT Energy Market | | | ✓ | | | | | | | | ✓ |
| DA Energy Market | | | | ✓ | | | | ✓ | | | ✓ |
| Emergency | ✓ | ✓ | | | | ✓ | ✓ | | | ✓ | |
| Capacity Market | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | | ✓ |
| Ancillary Services | | | | | ✓ | | | | ✓ | | ✓ |

**Table Key:**

RT DRP = Real Time Demand Response Program
RT PRP = Real Time Profiled Price Responsive Prgram
RT PrRP = Real Time Price Response Program
DA LRP = Day-Ahead Load Response Program
EDRP = Emergency Demand Response Program
ICAP/SCR = Installed Capacity/Special Case Resource Program
DA DRP = Day Ahead Demand Response Program
DS ASP = Demand Side Ancillary Services Program
EDR = Emergency Demand Response
DP = Direct Participation
✓ = Existing Participation

This table shows that the NYISO has programs that allow demand response resources to participate in all markets with the exception of the real-time energy market. The NYISO intends to rely on dynamic retail pricing and Smart Grid capabilities by load-serving entities to provide incentives for economic real-time demand response, although this would generally require regulatory reform at the state level. For this reason, no programs are shown in the table for the real-time energy market. We would note, however, that emergency demand response resources and SCRs are compensated based on real-time energy prices. In the next section, we discuss an alternative to dynamic real-time pricing if regulatory reform is not forthcoming.

Table 2 shows the existing demand response by type of resource for three ISOs. The table includes the peak hour reduction in load that was achieved as a percent of the total peak load in 2006 (the last year that peak demand event led to widespread emergency demand response in the three ISO areas). This reduction ranged from 2.1 percent for ISO-NE to 2.8 percent for NYISO.

**Table 2: Levels of Demand Response by Type**

| | Program | ISO-NE | NYISO | Midwest ISO |
|---|---|---|---|---|
| **Enrollment in ISO-Administered Programs** | RTO Emergency (2008 MW) | 1,634 | 2,108 | 300 |
| | RTO/ISO Economic (2008 MW) | 445 | 331 | 45 |
| **Enrollment in LSE-Administered Programs** | Non-ISO Emergency (2008 MW) | 270 | 200 | 8,600+ |
| | Non-ISO Economic (2008 MW) | | | |
| **Realized DR ISO** | Annual Demand Response (2007 GWh) | 235 | 0 (No Events) | Unknown |
| | Peak Hour Reduction (2006 MW) | 597 | 948 | 2,651 |
| | Reduction as a percentage of Peak Load (2006) | 2.1% | 2.8% | 2.31% |

This table shows that the NYISO has the highest level of demand response of any of the three ISOs we reviewed. The NYISO has some of the longest standing and most effective demand response programs, particularly in the area of emergency demand response.

### B. Existing Demand Response Programs

The NYISO offers two demand response programs to support reliability: the Emergency Demand Response Program ("EDRP") and the Installed Capacity-Special Case Resource Program (ICAP/SCR). Demand response resources may also participate in the NYISO's energy market through the Day-Ahead Demand Response Program ("DA DRP"), or the ancillary services market through the Demand-Side Ancillary Services Program ("DS ASP"). Resources

participate in EDRP through Curtailment Service Providers ("CSPs"), which serve as the interface between the NYISO and participants.

The ICAP/SCR program allows end-use customers that can meet certification requirements to offer unforced capacity ("UCAP') through Responsible Interface Parties ("RIPs").. Special Case Resources can participate in the ICAP Market just like any other ICAP Resource. Failure to curtail could result in penalties administered under the ICAP program. Participants may register either for EDRP or ICAP/SCR but not both.

The Targeted Demand Response Program ("TDRP") was introduced in July 2007. TDRP is a NYISO reliability program that deploys existing EDRP and SCR resources on a voluntary basis, at the request of a transmission owner, in targeted subzones to solve local reliability problems. The TDRP program is currently available in Zone J, New York City.

These EDRP, SCR and TDRP programs address both the responsiveness and economic barriers to demand response. It addresses the responsiveness barrier by providing a notification time of 2 hours. When the NYISO projects in real time that a shortage will occur, it calls for these demand response resources to reduce their consumption. Hence, these resources are not required to be dispatchable in a manner comparable to other resources. These programs also address the economic barrier by guaranteeing these resources a payment of no less than $500 per MWh (they are paid the higher of $500 per MWh or the LBMP at their location.) Therefore, if prices have fallen by the time the demand resource responds or the forecasted shortage otherwise does not occur, the demand resource will be compensated adequately.

The DA DRP program provides retail customers with an opportunity to bid their load curtailment capability into the Day-Ahead Market ("DAM") as energy resources. The bid floor price currently is $75/MWh. Bids are structured like those of generation resources. DA DRP

program participants may specify minimum and maximum run times and the hours they are available. They are eligible for bid production cost guarantee payments to make up for any difference between the market price received and their block bid price across the day. Load reductions scheduled in the DAM is obligated to curtail the next day. Failure to curtail results in the imposition of a penalty for each such hour equal to the product of the MW curtailment shortfall and the greater of the corresponding DAM and the Real-Time Market price of energy.

The DS ASP program was introduced in June 2008 and provides retail customers that can meet telemetry and qualification requirements with an opportunity to bid their load curtailment capability into the DAM and/or Real-Time Market to provide Operating Reserves and regulation service. DS ASP resources must qualify to provide reserves or regulation through standard resource testing requirements. Bids are submitted through the same process as generation resources. Although DS ASP resources are not scheduled for energy in the DAM, they are required to submit energy bids which are used in the co-optimization algorithm for dispatching operating reserve resources. Similar to the DA DRP, the energy bid floor price is currently $75/MWh. DS ASP resources are paid for operating reserves, which results in the obligation to reduce load when the resources economic thresholds are crossed. DS ASP resources are not paid for the energy reduction.

By allowing demand resources to sell ancillary services, the DS ASP program addresses a number of the barriers discussed above. With regard to the economic barriers, although demand response can be costly to curtail (if the marginal value of the consumption is high), it can nonetheless be a low cost provider of operating reserves that tend to be rarely deployed. Additionally, certain classes of operating reserves allow response in a substantially longer

timeframe than the energy market's dispatch interval (e.g., 30-minute reserves). This helps address the responsiveness barrier.

### C. Potential Changes Related to Demand Response

1. SmartGrid Enhancements

To facilitate small Demand Response resources in the ancillary service programs, NYISO will support the government agencies (FERC, NYS PSC, DOE) engaged in promoting the development of a SmartGrid to enable the distribution of real-time price signals and/or network conditions to consumers of electricity. This should enable those consumers to make more informed decisions on their time of usage patterns, although fixed retail rates virtually eliminates incentives to respond to this information.

2. Retail Electricity Rate Reform

To address the regulatory barrier discussed in the prior section, dynamic real-time retail pricing could be introduced by the states to align consumers' incentives with true costs of their consumption to the system. Dynamic retail pricing provides incentives for demand to respond to retail pricing even though it is not as responsive as generation and avoids the benchmarking issues for the ISOs that exist in most other types of real-time demand response programs. Currently, there is some dynamic pricing in New York. However, regulatory reform at the state level would be needed to introduce dynamic retail pricing broadly.

If the regulatory reform necessary to implement dynamic retail pricing does not occur, New York could consider other options for providing real-time economic demand response resources the same incentives that they would have under a dynamic retail pricing regime. For example, a real-time price responsive demand program that would make an efficient payment equal to the difference between the wholesale LBMP and the retail customer's rate is one option

for addressing this economic barrier. Paying this amount aligns the loads' incentives with the value of the energy to the system and the costs could be allocated to the corresponding LSE who might otherwise receive a windfall when its load curtails. However, such programs would require significant efforts by the ISO to monitor and measure performance of the demand resources.

3. Small Customer Aggregation to Provide Ancillary Services

One means to facilitate economic demand response in the wholesale market is to rely on CSPs or "Aggregators of Retail Customers" (ARC) that serve as an interface between the ISO and retail customers that can reduce their consumption. Order 719 requires that the ISOs remove barriers to ARCs participating in the ISO markets. NYISO currently meets the Commission's requirements for the SCR and DADRP programs, but not for its ancillary services market.

Although aggregations of demand resources at different meter locations are currently not permitted, the NYISO is working through its stakeholder process to develop market rules to permit small customer aggregations to provide ancillary services.

4. Infrastructure to Support Demand Response

To facilitate Demand Response, the NYISO is currently engaged in vendor selection to develop a Demand Response Information System (DRIS), which will automate much of what is currently done manually through spreadsheets. The Demand Response Information System will consist of the current core functionality of Registration Processing, Event Notification, and Reporting. It will also automate the ICAP/SCR Processing and the Event Performance, Management and Settlement Preparation calculations. Additionally, it will provide new functionality for managing Event and Meter data. The architecture and design of the DRIS will include the long-term vision to have configurable business rules to support new demand response

products, evolving market rules, internal and/or external user requests, and FERC orders. DRIS implementation is planned to occur in stages, with phase one deployment of selected features in the last quarter of 2009 and deployment of the remaining functions in 2010.

## VI. Conclusions

The NYISO was one of the first ISOs to initiate demand response programs and remains well ahead of most other RTOs, particularly in its development of emergency demand response capability. The NYISO is also the only ISO we know that allows emergency demand response to set energy prices. This is important for providing efficient economic signals in the short-run and long-run, including providing incentives to develop additional demand response.

Based on our review, we conclude that the NYISO's existing programs and proposed initiatives should substantially address the various barriers to demand response. However, we see two areas of potential improvements that the NYISO could consider. First, the NYISO should evaluate alternative approaches to foster real-time economic demand response if the regulatory reform necessary to introduce dynamic real-time pricing does not materialize. Second, the NYISO should ensure that other emergency actions and all forms of demand response contribute to setting efficient shortage prices in the energy and ancillary services markets.