

Killing Two Birds with One Stone: Can Real-Time Pricing Support Retail Competition *and* Demand Response?

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ABSTRACT

As retail choice states reach the end of their transitional, rate-cap periods, state regulators must decide what type of default supply service to provide to customers that have not switched to a competitive retail supplier. In a growing number of states, regulators have adopted real-time pricing (RTP) as the default service for large commercial and industrial (C&I) customers. Although this trend is driven chiefly by policy objectives related to retail competition, default service RTP may have the added benefit of stimulating demand response.

To evaluate the potential role of RTP as a means to both ends – retail market development and demand response – we conducted a comprehensive review of experience with default RTP in the U.S. and examined the emergence of RTP as a product offering by competitive retail suppliers. Across the ten utilities with default RTP in place in 2005, between 5% and 35% of the applicable load remained on the rate. Based on interviews with competitive retailers, we find evidence to suggest that a comparable amount of load in these states has switched to hourly pricing arrangements with competitive retailers. Many customers on default or competitive hourly pricing are paying prices indexed to the *real-time* spot market, and thus have no advance knowledge of prices. Because the price responsiveness of customers under these conditions has yet to be formally analyzed, and relatively few efforts have been undertaken to help these customers become price responsive, the *actual* demand response impacts from hourly pricing in retail choice states remains largely an open question. However, we find that policymakers and other stakeholders in retail choice states have various strategies at their disposal to capture the potential demand response benefits from hourly pricing, while simultaneously supporting retail competition.

Introduction

Real-time pricing (RTP) has a long and varied history in the U.S.¹ Over the past two decades, more than 70 vertically-integrated utilities in traditional, regulated markets have offered RTP as an optional alternative to their standard rates, on either a pilot or permanent basis. In terms of the demand response impacts, experience with optional RTP in regulated markets has been somewhat mixed. Although various studies have conclusively shown that many participating customers do reduce their load in response to high hourly prices – some significantly so – only a small fraction of optional RTP programs have attracted a sufficient number of participants for the associated load response to have any meaningful impact on system operations or planning (Barbose, Goldman & Neenan 2004).

¹ Real-time pricing is a type of retail electricity rate whereby consumers are charged prices that vary over short time intervals, typically hourly, and are notified of these prices no more than several days in advance.

With the advent of retail choice in approximately 20 states, the landscape for RTP has dramatically changed, with significant implications for its potential role in stimulating demand response. Regulators in a number of retail choice states have recently adopted RTP as the default service for large C&I customers that haven't switched to competitive retailers.² In addition, competitive retailers themselves are positioned to offer innovative variations on RTP.

This paper, based on a longer report, examines recent experience with RTP in retail choice states, both as a default service for large C&I customers and a product offered by competitive retail suppliers (Barbose et al. 2005). We conducted a detailed review of the regulatory proceedings leading to adoption of default RTP in six states and interviewed regulatory staff, utilities, and eight competitive retail suppliers active in these states. Based on the findings from this research, we identify implications for policymakers and other stakeholders seeking to develop demand response in retail choice states.

Overview of Default Service RTP in the U.S.

As of February 2006, RTP had been implemented as the default service by eleven investor-owned utilities (IOUs) in the U.S. and is planned or under consideration for fifteen others (see Table 1). Currently, default RTP is offered on a statewide basis in New Jersey and Maryland and by individual utilities in Pennsylvania and New York, although regulators in both of these states have plans or proposals on the table to extend default RTP on a statewide basis as well. Default RTP is also scheduled to take effect over the next year for the single IOU in Delaware and for Commonwealth Edison (ComEd) in Illinois.

Policy Context and Drivers for Default Service RTP

With several exceptions, default service RTP has emerged over the past three or so years, as utilities in states with retail choice have reached the end of their transitional periods. Most of these states designated an initial transitional period following the commencement of retail choice, during which time the utilities were required to continue offering a fixed-price default service, often subject to some form of rate cap or rate freeze, for customers that had not switched to a competitive supplier. Once these transitional periods expired, utilities and state regulators were faced with the need to develop a "post-transitional" default service. Although the specific form of the ensuing regulatory process has varied considerably among states, in general, each was guided by some set of broad statutory or pre-established regulatory mandates (e.g., that default service be "market-based") and involved consideration of many issues by a large number of stakeholders.

Based on our review of the regulatory record and interviews with stakeholders involved in the regulatory process, it is evident that adoption of default service RTP in these states has been driven primarily by objectives related to retail market development. From the standpoint of cultivating a competitive retail market, RTP has several features that make it an attractive candidate for default service compared to alternative rate structures with energy prices that are fixed for months or years at a time. First, default service RTP encourages switching, by motivating customers that do not want to face hourly prices to seek out alternative arrangements with competitive retailers. Second, it avoids the use of class-average load profiles for default

² Default service is alternatively referred to as "standard offer" or "provider of last resort" (POLR) service.

service energy pricing and the associated intra-class cross-subsidies that distort the retail market. Third, because RTP prices always reflect current market conditions, regulators have less need to impose switching restrictions or exit fees to discourage customers and/or suppliers from taking advantage of seasonal arbitrage opportunities between default and competitive service. Finally, the fact that RTP prices always reflect current market conditions also reduces the risk that suppliers will be unable to compete against the default service should wholesale market prices rise, and thus provides more certainty for suppliers when deciding whether or not to enter the market.

Table 1. Default Service RTP in the U.S.

State	Utilities	Year of Implementation	Applicable Customer Class	Other Utility Supply Options for Customers in the Default RTP Class
Delaware	Statewide	2006 (planned)	Transmission level voltage	None (once implemented)
Illinois	ComEd	2007 (planned)	>3,000 kW	None (once implemented)
Maryland	Statewide	2005	>600 kW	None currently. For the first year after statewide RTP implementation, a fixed price option served as the default service and RTP was offered on an opt-in basis.
New Jersey	Statewide	2003	>1,250 kW	None
New York	NMPC	1998	>2,000 kW	None currently. NMPC offered customers a one-time opportunity in 1998 to contract for fixed-price load blocks for up to five years.
	CHG&E	2005	>500 kW	None
	All other IOUs	2006 or later (proposed)	Varies by utility	None (once implemented)
Pennsylvania	Duquesne	2005	>300 kW	A fixed-price service is offered on an opt-in basis until mid-2007
	All other IOUs	2007 or later (proposed)	>500 kW	This issue has not yet been resolved.

Rate Design and Implementation Details

The design and implementation of default service RTP involves a great many details; see Barbose et al. (2005) for a more comprehensive discussion. In this section, we provide background information on several design and implementation issues relevant to demand response and to subsequent discussions in this paper.

Default service RTP rates adopted to date are all based on a similar rate design. All employ an *unbundled, unhedged* energy charge, whereby each customer is billed for its energy consumption on an hourly basis by multiplying its total usage in that hour by the prevailing hourly energy price. The hourly energy prices, in turn, are based on the zonal, hourly prices in the wholesale energy market administered by the independent system operator (ISO) or regional transmission organization (RTO). One important distinction can be made between the default RTP rates adopted in New York and by ComEd and those adopted in the Mid-Atlantic states (New Jersey, Maryland, Pennsylvania, and Delaware). The New York and ComEd default RTP rates are indexed to the *day-ahead* energy market, for which hourly prices are published a day in advance. In contrast, the default RTP rates in the other states are indexed to the PJM *real-time*

energy market. Hourly prices in this market are not determined until after the applicable hour has elapsed, thus customers do not know the exact prices they will be charged until after-the-fact.

One important implementation issue is the customer size threshold that defines the default RTP customer class. The first utilities to adopt default RTP did so only for the very largest customers (>1-2 MW billing demand). More recently, though, default RTP has been adopted for much smaller C&I customers, down to 300 kW. In many cases, the choice of a particular customer size threshold has reflected some consideration (usually informal) of customers' ability to manage hourly pricing risks or to obtain an alternative arrangement with a supplier. In some states, the decision has also been driven by the capabilities of the existing metering and billing infrastructure, although regulators in New Jersey and Maryland opted to significantly expand interval metering deployment in conjunction with default RTP.³

Another key implementation issue is whether the utility offers any type of hedging option for customers in the default RTP class and, if so, what type and for how long. The default RTP rates currently in place illustrate a number of different models. New Jersey took the "sink-or-swim" approach, offering no hedging options for customers in the default RTP class that haven't switched. Duquesne and the Maryland utilities implemented RTP along with a temporary, alternative fixed-price supply option, although there were some significant differences between these two cases. Duquesne, which will continue to offer a fixed price service to customers in the default RTP class until mid-2007, offers this service on an opt-in basis. In contrast, Maryland utilities offered the fixed-price option as the default service for a one-year period, during which time customers could opt onto RTP. After that one year period, the fixed price service expired, and RTP became the default, and only, utility supply service offered for large C&I customers. Finally, Niagara Mohawk (NMPC) also offered its default RTP customers a hedging option, but rather than a separate fixed-price service, NMPC offered these customers the one-time opportunity to contract for a *portion* of their load at a fixed-price, for up to five years. NMPC customers that elected this option designated peak and off-peak period load blocks for each year (i.e., X kW during peak period hours and Y kW during off-peak hours) that they purchased from the utility at a fixed price, and purchased any residual load in each hour either on the default RTP rate or from a competitive retailer.

The level of assistance provided to help customers on default RTP respond to hourly prices has varied considerably among states. In response to direction from state regulators, utilities in New York State have proposed, among other things, to provide customers with software tools to view and analyze hourly load data. The New York State Energy Research and Development Authority (NYSERDA) has also taken an active role in encouraging the development of demand response in the state. Since 2001, NYSERDA has offered a variety of public benefit funded programs that provide technical assistance to help customers identify load response strategies and financial incentives for enabling technologies (e.g., interval meters, energy information systems, load control devices, upgrades to onsite generators). New Jersey state regulators have also recently approved funding for activities to help customers in the default RTP class identify and implement demand response and energy efficiency measures, including training of building managers, energy audits, and an as-yet-unspecified "peak load reduction" program. Other than the efforts described above, states with default RTP have taken few active

³ In Maryland, many of the customers in the default RTP class initially lacked interval meters, and additional meters were installed prior to default RTP implementation. In New Jersey, regulators directed the utilities to install interval meters for all customers >750 kW, even though the customers initially subject to default RTP were all >1.5 MW.

steps to help customers on default RTP assess and implement load response strategies. Although some amount of customer outreach and education has typically been conducted in conjunction with default RTP implementation, these activities have generally focused on explaining the default service rate and ensuring that customers are informed about their opportunity to shop for alternatives with competitive retailers.

Hourly Pricing and Related Products Offered by Competitive Retail Suppliers

We interviewed eight prominent competitive retailer suppliers operating in regions with default service RTP. Together, these eight retailers represented approximately 50% or more of the competitive C&I sales in each state with default RTP and more than 60% of the competitive C&I sales nationally in 2004.

We asked these retailers to describe their product offerings for large C&I customers in regions with default service RTP. All offer large C&I customers the option to purchase 100% of their hourly energy usage at hourly prices indexed to the real-time and/or day-ahead spot market, although two retailers limited this offering to states with default RTP. A number of retailers market their hourly pricing product as providing a “guaranteed savings” off the default service RTP rate. The savings arise because the default RTP rates typically include some type of administrative or retail “adder”, as well as various fixed-price charges (e.g., for ICAP or ancillary services), which competitive retailers may be able to beat.⁴ Competitive retailer suppliers may also highlight the potential savings that hourly pricing arrangements offer compared to fixed-price products, which incorporate an implicit “risk premium” that customers can avoid by purchasing their energy at hourly prices.

All retail suppliers reported offering customers the opportunity to combine hourly pricing with some type of financial or physical hedge.⁵ The most common of these products is block-and-index pricing (see Figure 1). Under this type of arrangement, the customer contracts for blocks of load at a fixed \$/kWh price and pays hourly spot market prices for usage in each hour above their block level. Retail suppliers typically offer customers some degree of flexibility in customizing the shape of the load block (i.e., the hours and days of the week covered by the block) as well as the size of the load block relative to the customer’s total load. Some retail suppliers treat the load block as a take-or-pay obligation, in which case customers have no financial incentive to reduce their load below their block level. Others credit customers for load reductions below the block level, hour-by-hour, at the prevailing spot market price, the same way they settle load above that level. In addition to block-and-index pricing, several retail suppliers indicated that they offer other types of hedging arrangements in combination with hourly pricing (e.g., price caps or collars), but typically just for very large and sophisticated customers.

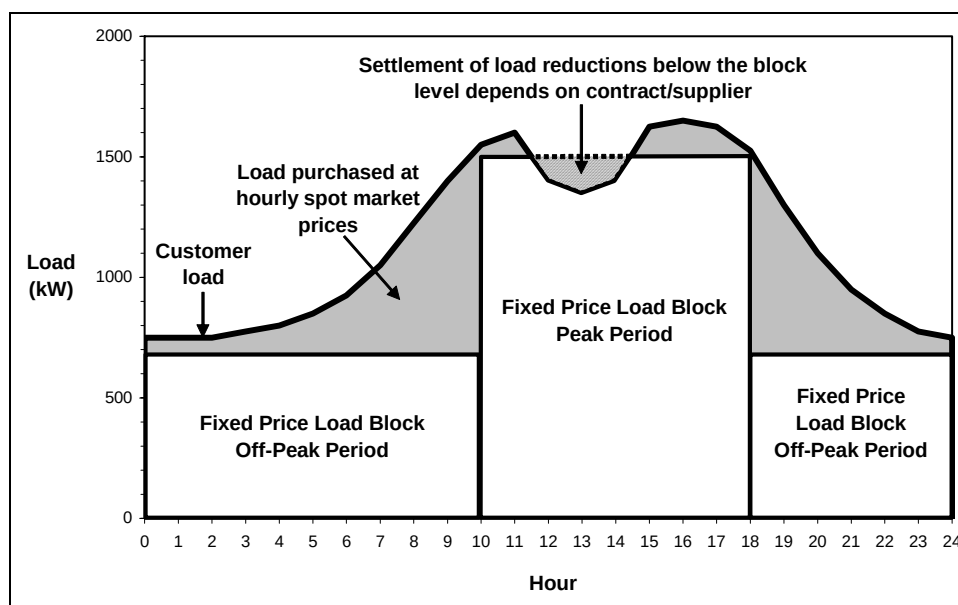
We also asked retail suppliers about the types of products or services they offer in combination with hourly pricing, to help customers respond to high hourly prices. Suppliers reported offering few services of this kind. Several indicated that they offer customers internet-based access to their hourly interval load data with a one-day or shorter time delay, in most cases

⁴ Many default RTP rates incorporate a retail adder to provide headroom for competitive retailers who bear retailing costs (e.g., marketing) not borne by the default service provider. Alternatively, some states provide an explicit “shopping credit” for customers that switch to a competitive retailer.

⁵ Although, in principle, suppliers could offer financial hedge products to customers on default RTP, all of the suppliers we interviewed indicated that they only offer these products to customers that have switched from the default service.

for an additional fee. Some offer a price alert service whereby they notify customers via email or pager if hourly prices reach a threshold level specified by the customer. However, none of the suppliers we interviewed offer technical assistance to help customers on hourly pricing identify, analyze, or implement load response strategies. Many do have a separate energy services group within their company or an affiliated ESCO that offers technical services to help customers reduce energy costs. However, these affiliated organizations focus primarily on energy efficiency measures, not DR, and none of the suppliers currently integrate these types of energy management services with their retail supply function or have any formal process for marketing these services to customers on hourly pricing or vice-versa.

Figure 1. Block-and-Index Pricing Arrangement



Customer Exposure to Hourly Pricing in Retail choice states

The overall demand response impact from hourly pricing is a function of the amount of load exposed to hourly pricing and the price responsiveness of those customers. In retail choice states, customers can face hourly pricing through either of the two sources discussed previously: default service RTP or hourly pricing arrangements offered by competitive retailer suppliers. In this section, we discuss current enrollment in default RTP and present our estimates for the amount of load facing hourly prices through contracts with competitive retailers in three states.

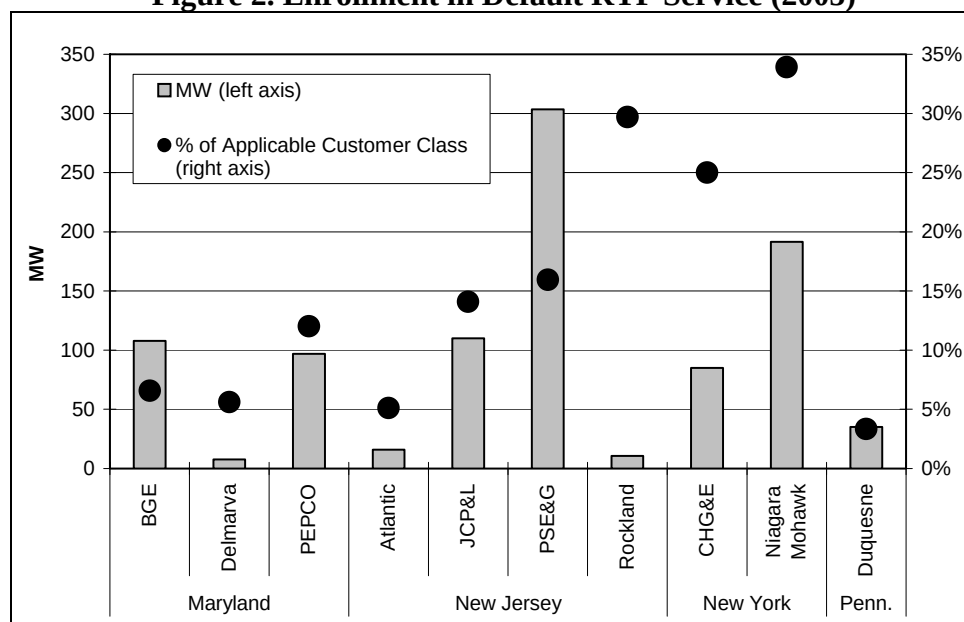
Customer Enrollment in Default RTP

Among the ten utilities with default RTP in place at the end of 2005, most had less than 15% of the load in their default RTP class left on the rate, although several had 25-35% of the applicable load remaining (see Figure 2). With the exception of Duquesne, all other customers in the default RTP classes have switched to competitive retailers. Duquesne still offers customers in their default RTP class a fixed-price supply service, and about 25% of the load in the class opted onto the fixed-price option in 2005 (compared to just 3% remaining on default

RTP). Despite the small percentage of customers remaining, the amount of load on default service RTP cannot be dismissed as a potential demand response resource. Six of the ten utilities have close to 100 MW or more remaining on default RTP, and an appreciable degree of price responsiveness among these customers could, in principle, have a discernable impact on reliability and market performance.

Drawing inferences from this enrollment data about customers' willingness to face hourly prices is not altogether straightforward. Certainly, some customers have responded to being placed on default RTP (or the prospect of it) by seeking out fixed price supply arrangements with competitive providers. However, not all switching can be attributed to a rejection of hourly pricing. In several cases (e.g., Duquesne and Maryland), much of the switching occurred prior to implementing default RTP. Also, many customers have left default RTP to purchase their supply from competitive providers at hourly prices. At the same time, though, some customers have no doubt remained on default RTP only out of inattention or for want of acceptable fixed price offers, thus it would also be erroneous to assume that all customers remaining on default RTP are interested in paying hourly prices.

Figure 2. Enrollment in Default RTP Service (2005)



Data for most utilities are based on enrollment in Summer 2005. Niagara Mohawk data are from Summer 2004.

Market Penetration of Hourly Pricing with Competitive Retailers

We asked retail suppliers to estimate the percentage of their large C&I customers (i.e., customers for which RTP is the default service) on hourly pricing. Suppliers reported market penetration rates for hourly pricing ranging from 50-75% of their large C&I load in New Jersey but reported lower values, typically in the range of 5-25%, for most other regions (see Table 2).⁶

⁶ As a point of comparison, Suez Energy, a competitive retailer operating throughout the U.S., recently conducted market research and found that roughly 20% of C&I customers interviewed in Texas and New England indicated a preference for spot market indexed contracts over fixed price contracts (Suez Energy Resources 2004, 2005). Surveys such as these reflect customers' intentions, and are necessarily a reliable indicator of their actual behavior.

The values across regions are not directly comparable to one another, because the customer size threshold defining the large C&I class (i.e., the customer size threshold for default RTP) differs quite substantially among these regions (see Table 1). If, as many suppose, larger customers are more predisposed to hourly pricing, then it should come as no surprise that the market penetration rates are higher in those regions with a higher customer size threshold for default RTP (e.g., New Jersey and NMPC's service territory).

When asked about factors driving customer demand for hourly-priced supply contracts, retail suppliers indicated that customers' ability and willingness to respond to hourly prices was typically not a significant driver. Suppliers offered several alternative explanations: (1) some customers are looking for a guaranteed savings off of the default RTP rate; (2) some are simply riding the market, waiting until the time is right to lock in a fixed price contract; and (3) some have decided that the premium for a fixed price, full-requirements service is greater than the value they place on the price certainty such contracts provide. Finally, almost all suppliers suggested that much of the current demand for hourly pricing arrangements was temporary, due to low spot market volatility and relatively mild weather, and would probably wane over the long run.

Table 2. Market Penetration of Hourly Pricing among Large C&I Customers Reported by Competitive Retail Suppliers

Large C&I Market	Supplier	Percent of Large C&I Load on Hourly Pricing
NMPC	2	>90%
New Jersey	2	75%
	5	50-60%
Maryland	6	50%
	5	5%
PJM region*	6	20%
	3	10%
NYISO region	4	<25%
	6	10-15%
ISO-NE region	1	10%

* Some suppliers provided market penetration data for the PJM region as a whole in addition to or instead of providing data for New Jersey and Maryland individually.

Total Customer Load Facing Hourly Prices in Three Regions

Very little information is currently available in the public domain regarding the total load in retail choice states facing hourly prices through contracts with competitive retailers. As a first step toward filling this void, we estimated the total large C&I customer load on hourly pricing with competitive retailers in New Jersey, Maryland, and NMPC's service territory in New York. We derived the estimates for New Jersey and Maryland from the information in Table 2 and from public data on suppliers' market share in each state. For NMPC, we used data from surveys of customers in NMPC's service territory, conducted for a different project and reported in Goldman et al. (2005).⁷ We then combined these estimates with data on default RTP enrollment, to estimate the total load facing hourly prices in these three markets.

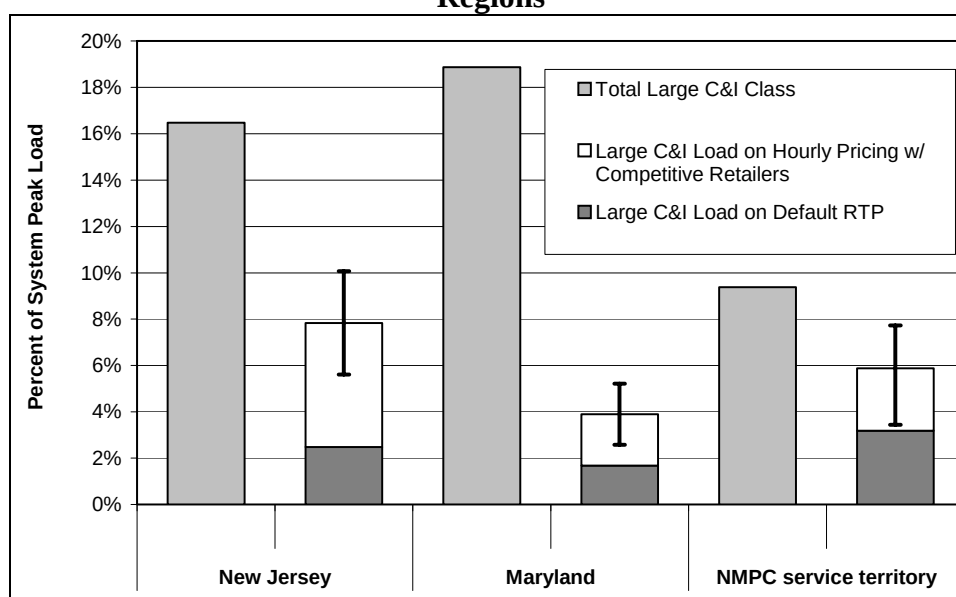
Using this approach, we estimate that, as of Summer 2005, 35-60% of the large C&I load

⁷ For more information on our derivation, refer to the full report (Barbose et al. 2005).

in New Jersey, 15-25% in Maryland, and approximately 65% in Niagara Mohawk's service territory were facing hourly prices, either through the default RTP service or a competitive retail supply contract. The estimates for New Jersey and Maryland are presented as ranges to reflect the uncertainty associated with our extrapolation to suppliers that were not interviewed.

Given that the total large C&I class in each of these regions is but a small percentage (10-20%) of the total system load, those large C&I customers on hourly pricing represent a correspondingly smaller fraction of the total system load in region. Based on our mid-point estimates, approximately 8% of the system peak load in New Jersey, 4% in Maryland, and 6% in Niagara Mohawk's service territory is facing hourly prices through either default RTP or an hourly pricing arrangement with a competitive retailer (see Figure 3).

Figure 3. Estimated Large C&I Load Facing Hourly Prices in Three Regions



The large C&I class in each region is defined to be those customers for which RTP is the default service (see Table 1 for the customer size threshold used to define this class).

Load Response from Customers Facing Hourly Prices

Given the information presented in Figure 3, the key question for characterizing the associated demand response is: How responsive are these customers to changes in hourly spot market prices? Of the default RTP rates currently in place, only NMPC's has been subject to any formal analysis of customers' price response (Goldman et al. 2004 and 2005). The most recent analysis, which examined five years' of customer load data, found that 119 NMPC customers facing day-ahead hourly prices reduced their load *in aggregate* by an amount equal to approximately 10% of their combined demand, when day-ahead peak period prices were five times higher than off-peak prices.⁸ Applying this percentage load reduction to all large C&I

⁸ This finding is generally consistent with analyses of optional RTP programs in the U.S., which have typically been found to elicit aggregate percentage load reductions on the order of 10-30% of participants' combined load (Barbose, Goldman & Neenan 2004).

customers in NMPC's service territory facing hourly prices (shown in Figure 3), yields a total load reduction of approximately 50 MW, equivalent to 0.6% of the system peak demand.

The price responsiveness observed among NMPC customers who pay day-ahead market prices may not translate to customers on default RTP in Maryland, New Jersey, and Pennsylvania, who pay prices indexed to the real-time market. Utility and regulatory staff interviewed in these states offered a near-unanimous opinion that customers on default RTP probably have not provided any significant load response to hourly prices. However, given that no formal study of these customers' price responsiveness has been performed, it would be premature to draw any firm conclusions.

Similarly, little hard evidence is available to characterize the load response from customers on hourly pricing with competitive retailers. In our interviews, all suppliers indicated that they had not formally analyzed the load response from customers on hourly pricing, but all shared the general belief that the vast majority of customers on hourly pricing do not modify their usage in response to changes in hourly prices. Accordingly, all suppliers indicated that they do not account for customer price response in their scheduling or procurement activities, other than perhaps a small handful of customers with pre-established load reduction routines.

A number of factors may underlie this apparent lack of price response. Many suppliers pointed to their belief that customers have generally opted for hourly pricing for reasons unrelated to load response (e.g., to receive a guaranteed savings off the default service rate or to avoid the risk premium embedded in fixed-price service), and that therefore these customers probably have little interest in or capability to actively manage their load in response to hourly prices. That being said, spot market price volatility was quite moderate during the several years preceding our interviews. Thus, some customers may have not yet had the requisite incentive to exhibit their inherent price responsiveness. Furthermore, because many of these customers are paying hourly prices indexed to the real-time market, the structure of the price signal itself may limit the magnitude of any potential response.

Policy Implications for Developing Demand Response in Retail Choice States

Several key implications emerge from the findings above, for policymakers and other stakeholders in retail choice states seeking to develop demand response.

(1) Better information about the price responsiveness of customers in retail choice states is needed to inform key policy questions.

A variety of critical policy and wholesale market design issues hinge on the price responsiveness of retail electricity consumers. Yet, little information is currently being collected in retail choice states regarding either the amount of load facing hourly prices or the actual price responsiveness of those customers. To address this critical information void, federal and state regulators and ISO/RTOs should consider undertaking efforts to periodically collect and analyze data on retail customers' supply arrangements and quantify the extent of the load response from hourly pricing and other dynamic pricing options.

(2) The indirect effects of default RTP on the development of demand response may be just as important as the direct effects.

The direct demand response impacts from default RTP consist of whatever load response is provided by customers remaining on the rate. Given that most customers have not chosen to remain on default RTP and in most cases will likely continue to migrate to competitive retailers, the direct demand response impact from default RTP may ultimately be rather limited. However, our findings do highlight a number of potential *indirect* demand response impacts from default RTP. First, some customers evidently use the default rate as a benchmark and seek out competitive contracts with a comparable pricing structure. Thus, designating RTP as the default service, instead of a fixed-price rate, may create additional demand for hourly pricing options in the competitive market. Similarly, education and training conducted as part of default RTP implementation, as well as customers' direct experience on the rate (even if unintended), may help to raise customer awareness and comfort with hourly pricing, which may also serve to build interest in hourly pricing products offered by competitive retailers. Finally, the deployment of additional interval metering in conjunction with default RTP may stimulate greater interest in hourly pricing arrangements with competitive retailers and in demand response programs, which typically also require interval meters. Policymakers should bear these potential indirect effects in mind when developing default service rates and implementation plans.

(3) Default RTP indexed to day-ahead market prices can be an effective strategy for simultaneously supporting retail market development and demand response.

Default RTP rates that are indexed to the day-ahead energy market provide customers with a more compelling incentive for price response than those that are indexed to the real time market, while retaining the essential features that make hourly pricing an attractive default service. Furthermore, because hourly pricing arrangements with competitive retailers often mirror the default RTP rate design, implementing default RTP indexed to day-ahead market prices will likely spill over into the competitive market, resulting in a greater potential price response from customers purchasing their supply from competitive providers.

(4) Efforts are needed to bolster the price responsiveness of customers paying hourly prices.

Our research reveals encouraging signs for the development of price responsive demand in retail choice states, but also important barriers. On the one hand, it is clear that customers in some retail choice states now have ample opportunity to purchase their electricity at hourly prices, and that a sizable fraction of large C&I customers (20-60% across the three markets we examined) have chosen to do so. However, it is unclear whether an appreciable level of price response has, or is likely to, accompany this growth in the availability and adoption of hourly pricing. In most states with default RTP, few activities have been conducted to help customers identify, analyze, or implement load response strategies. Nor do retail suppliers generally offer such services to their customers on hourly pricing. Given consumers' entrenched habits and expectations, developed over decades of paying for electricity at fixed prices, load response to hourly pricing will likely be quite limited in the near to mid-term in the absence of concerted efforts to nurture customers' price response capabilities.

In many customer choice states, the regulatory commission and utilities have conducted general customer education activities to provide basic information about restructuring and/or default service. Policymakers should consider using these forums as an opportunity to help

customers better understand the potential cost savings that can be achieved by responding to hourly spot market prices. Additional programmatic efforts, such as facility DR audits, customer training, and financial incentives for DR enabling technologies should also be considered for customers on hourly pricing, perhaps in conjunction with broader energy efficiency and load management initiatives.

Acknowledgements

This work was supported by the Office of Electricity Delivery and Energy Reliability of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231 and coordinated by the Demand Response Research Center on behalf of the California Energy Commission Public Interest Energy Research (PIER) Program.

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