



Description of integrated pilots/demonstrations/field tests/existing practices

1. Name of the case:

Not All Large Customers Are Made Alike: Disaggregating Response to Default-Service Day-Ahead Market Pricing

2. What is integrated with DSM

DG	<input checked="" type="checkbox"/>
Energy storage	<input checked="" type="checkbox"/>
Smart grid technologies	<input checked="" type="checkbox"/>

3. What is the level of commercialization

Research project	<input checked="" type="checkbox"/>
Demonstration	<input type="checkbox"/>
Field test	<input type="checkbox"/>
Existing practice	<input checked="" type="checkbox"/>

4. Where to find more information?

- Contact person: Nicole Hopper and Charles Goldman
- Company: Lawrence Berkeley National Laboratory / Neenan Associates
- web-site: <http://drcc.lbl.gov/pubs/59629.pdf>

5. Objectives of the case

Since the inception of real-time pricing (RTP) tariffs, policymakers and program designers have assumed that large customers, particularly industrial facilities, are the best candidates for RTP tariffs (and other time of day tariffs). This assumption is based partly on practical considerations (large customers can provide potentially large load reductions) but also on the premise that businesses focused on production cost minimization are most likely to participate and respond to opportunities for bill savings. In light of increasing interest by policymakers in default-service RTP in regions with organized wholesale markets and varying degrees of retail choice, disaggregated information on customer adaptation and response strategies, in such contexts, are needed to understand the DR potential of default-service pricing initiatives and to identify customer market segments that would most benefit from policies designed to enhance their price response potential. This study addresses those questions.



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6. Business rationale/model

Day-ahead RTP involves routinely sending price signals to customers on a day-ahead basis (12-24 hour timeframe). It promotes *economic* price response, in which customers are motivated by savings from curtailing usage when prices are high. This response provides system-wide benefits in the form of lower wholesale market clearing prices. In contrast, NYISO emergency programs send signals on a contingency basis (two-hour timeframe) to promote *emergency* response, thereby providing system reliability benefits. Day-ahead RTP and emergency DR programs fulfill separate needs through distinct designs and attributes. We conclude that day-ahead RTP and emergency DR programs complement each other and should not be viewed as an “either-or” proposition.

7. Technologies used

Many RTP customers in this study have installed technologies and systems that have the potential to enhance price response. Among 76 survey respondents, 49% reported ownership of energy management control systems (EMCS) and/or peak load management (PLM) devices, 41% reported owning energy information systems (EIS) and 55% reported onsite generation. However, the majority indicated that they do not use these systems to respond to high hourly prices. Instead, EMCS/PLM and EIS devices are typically used for across-the-board energy savings (efficiency type improvements) or managing peak demand charges. Onsite generation is most often used for emergency backup or reliability reasons. At the same time, many customers reported specific load curtailment actions that are relatively “low-tech”, such as turning off lights, reducing air conditioning and office equipment usage, and asking employees to conserve. Some industrial customers reported shutting down plants or buildings or altering their production processes. There was a correlation between the presence of onsite generation and highly responsive customers. Overall, though, we were unable to find a meaningful statistical relationship between ownership of these technologies and customers’ price response, although this is probably influenced by a small sample size (55 customers). Although pilot studies have demonstrated the potential for semi- or fully automated DR through integrated energy management and information systems, most large customers currently do not have such practices in place, even though many have the needed equipment. As explanation, some customers told us the potential savings from responding to high hourly prices do not justify investing in strategies to respond

8. Short description of the case

This case study of Niagara Mohawk Power Corporation (NMPC)’s large customer RTP tariff demonstrates the extreme diversity of large customers’ response to hourly varying prices. While two-thirds exhibit some price response, about 20% of customers provide 75-80% of the aggregate load reductions. Manufacturing customers are most price-responsive as a group,

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followed by government/education customers, while other sectors are largely unresponsive. However, individual customer response varies widely. In sum, large customers do currently provide moderate price response, but there is significant room for improvement through targeted programs that help customers develop and implement automated load-response strategies.

9. Achieved/expected results (operational savings, CO₂, efficiency enhancement)

The overall level of price response from RTP customers is modest, but encouraging: the load-weighted average elasticity of substitution is 0.11. This result is consistent with other studies of large customer price response.

Policymakers are particularly interested in the peak load reductions from RTP—the amount of DR they can expect at high prices. Estimated aggregate load response for the 119 customers is shown in Figure 4. At peak prices five times higher than off-peak prices (the highest price ratio observed during the study period) this group of customers would be expected to curtail their electricity usage by about 50 MW. This is about 10% of their combined summer peak demand.

Load-weighted sector-average elasticities were estimated for each business sector. The manufacturing sector exhibited the highest elasticity, of 0.16. Government/education customers are also quite price-responsive (0.10)—an important finding given the common assumption that industrial customers are the best candidates for price response. The other sectors—commercial/retail, health care and public works—are considerably less responsive, with average elasticities of 0.06, 0.04 and 0.02, respectively.

While the sector-level results above show clear distinctions between different customer groups, they mask considerable variation in price responsiveness among customers within each group. About one-third of customers had zero elasticity estimates. This means that they used peak and off-peak electricity in fixed proportions, regardless of prices. For the other two-thirds of customers, with positive substitution elasticities, some degree of price response was observed; although there is wide variance in this capability. Eighteen percent of the customers provide 75-80% of the aggregate demand response.

In surveys and interviews, more customers told us they respond to NYISO program events (60%) than high hourly prices (5%).

Based on two years of interviewing and surveying RTP customers, we are convinced that an important, though difficult to measure, driver is the presence of a price-response “champion” within customer organizations. Champions are individuals willing to take the initiative to advance price response as a priority within their organization, often identifying creative ways to overcome obstacles to price or emergency program response that may transform company policy beyond their tenure. For example, we encountered individuals at public institutions who had taken initiatives to their governing agencies to permanently alter procurement rules, giving them



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more flexibility in managing energy costs. Others had simply taken the time to learn about their options in a changing environment and taken full advantage of available opportunities to control their energy costs.

10. Lessons learned

The experience of NMPC's RTP customers provides a unique source of information on how large customers adapt to default-service day-ahead market pricing in the context of retail competition over several years. The results provide evidence that default-service day-ahead RTP does promote everyday economic price response among large customers, even among many who have switched suppliers but still elect to face day-ahead market prices. However, while two thirds of customers exhibit some price response, about 20% account for 75-80% of the observed demand reductions. Differences in price response among customers are driven not only by business sector, but are strongly influenced by participation in NYISO emergency DR programs, as well as other, less tangible factors such as the presence of price response "champions". Policymakers need to recognize that not all large customers are alike, and most are currently not very price responsive. This is in part because they do not adopt fully automated DR strategies, even though many have installed the technologies necessary to do so. This suggests that there is a role for targeted technical assistance programs to help customers develop and implement more sophisticated price response strategies with the goal of improving overall DR potential.