Customer Driven Rate Design

PRESENTED TO
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Annual Meeting

PRESENTED BY
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THE Brattle GROUP
A Customer’s Potential

- 2013/14 Polar Vortex
- Record low temperatures
- Fuel supply interruptions
- Electricity demand in New England was met, but at high cost
  - Jan 23 2014: $78/MMBtu NG
  - DA LMPs: $400/MWh avg; $850/MWh hourly max
- **Oil peakers providing 25% of generation**
- 2017/18: similar challenges
- Underlying problem is complex, and it will take some time for supply-side solutions to develop

![Chart: New England wholesale natural gas and electricity prices](chart.png)

**How many more customers could help in these situations, if they had better awareness of the environmental and/or price impacts?**

Source: U.S. Energy Information Administration, based on SNL
Value of Customer Flexibility during Extreme Situations

• Interest in connecting customers with price signals surges after times of crisis
  • First big wave of interest in the U.S. after 2000/2001 California power crisis
  • By 2013, more than 30 pilots featuring more than 160 energy-only pricing treatments were carried out around the globe

• In practice, demand response programs have been traditionally focused on reducing consumption during a handful of super-peak hours
Now More Than Just a Resource during Crisis

• The concept of flexible loads is nothing new, but value now recognized in the context of planning for, and operating, a cleaner electricity system

• Attention has turned to load shift, to make the best use of low-cost and clean resources when they are available

• And today, customers are even pushing for more options to customize power supply and rates
  • Looking for opportunities to save money—and more: improve greenness, support local resources
  • And actively shopping for what they want: smarter homes, Community Choice Aggregations, Direct Access is next
And Today’s Technology Enables Customer Responsiveness More than Ever

• About half of all customer meters are advanced
• Big data statistical analysis can be done to better understand customer data and DR opportunities
• Webware and apps can simplify and customize two-way communications with customers
• Many customers are used to using tech to help them make complex choices
What are meaningful choices and options for customers?
Customers are Diverse

Going back to the New England example, what works for me won’t work for everyone.

I’m responsive to phone apps and plugged into energy enough to want to respond to alerts on short notice.

But my neighbor relies mostly on a land line, and doesn’t have as much last-minute flexibility to adjust consumption.

My other neighbor is tech-savvy, but she just wants a stable, simple, predictable bill, and doesn’t want to think about electricity at all.
And the Basis for Fears in Rate Reform

- Unexpected bill impacts
- Customer backlash
- Failure to realize expected benefits
- Impacts on sensitive or disadvantaged customers
In the 1960s, Professor Bonbright laid the foundation for regulated rate design.
Oklahoma Gas and Electric Company unlocked the mystery: stated preference conjoint analysis

Customer Choices Among Pricing Plans (2013)

Residential Customers

Demand Customers

Source: Scott (2016). Survey responses include both Oklahoma and Arkansas customers. Arrows next to the residential customer results represent changes from an earlier survey conducted in 2010.
But Can We Really Give Customers All of These Options

Yes! Utilities have already amassed broad experience in alternative rate designs

- Guaranteed bill (GB)
- GB with discounts for demand response (DR)
- Higher fixed charge (FC)
- Standard tariff
- Demand charge
- Time-of-Use (TOU)
- Critical peak pricing (CPP)
- Peak time rebates (PTR)
- Variable peak pricing (VPP)
- Demand subscription service (DSS)
- Transactive energy (TE)
- Real-time pricing (RTP)
Do Customers Actually Respond?

The industry has much experience in demonstrating customer responsiveness, and technology is shown to help

Peak Reduction by Pricing Treatment

Source: (Faruqui et al, 2017).
# Arizona Public Service’s 5 Residential Rate Options

## Residential Plan Comparison*

<table>
<thead>
<tr>
<th>PLANS</th>
<th>BASIC SERVICE CHARGE (PER DAY)</th>
<th>ENERGY CHARGE (PER KW)</th>
<th>OFF-PEAK PRICING</th>
<th>SUPER OFF-PEAK WINTER PRICING</th>
<th>ON-PEAK SUMMER PRICING</th>
<th>ON PEAK WINTER PRICING</th>
<th>ON PEAK SUMMER PEAK USAGE (DPRMAND) CHARGE PER KW</th>
<th>ON PEAK WINTER PEAK USAGE (DPRMAND) CHARGE PER KW</th>
<th>OFF PEAK HOURS</th>
<th>SUPER OFF PEAK WINTER HOURS</th>
<th>ON PEAK HOURS</th>
<th>ENERGY USE RESTRICTIONS (12-MONTH AVERAGE)</th>
<th>RENEWABLE ENERGY COMPATIBLE</th>
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</thead>
<tbody>
<tr>
<td>Saver Choice</td>
<td>42.7¢</td>
<td>-</td>
<td>10.87¢</td>
<td>3.20¢</td>
<td>24.31¢</td>
<td>23.068¢</td>
<td>-</td>
<td>-</td>
<td>8 p.m.–3 p.m. weekdays, all weekend +10 holidays</td>
<td>10 a.m.–3 p.m. weekdays</td>
<td>3 p.m.–8 p.m. weekdays</td>
<td>-</td>
<td>Yes (with grid access charge)</td>
</tr>
<tr>
<td>Saver Choice Plus</td>
<td>42.7¢</td>
<td>-</td>
<td>7.79¢</td>
<td>-</td>
<td>13.16¢</td>
<td>11.017¢</td>
<td>$8.40</td>
<td>$8.40</td>
<td>8 p.m.–3 p.m. weekdays, all weekend +10 holidays</td>
<td>-</td>
<td>3 p.m.–8 p.m. weekdays</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>Saver Choice Max</td>
<td>42.7¢</td>
<td>-</td>
<td>5.23¢</td>
<td>-</td>
<td>8.68¢</td>
<td>6.376¢</td>
<td>$17.44</td>
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<td>Lite Choice</td>
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<td>-</td>
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<tr>
<td>Premier Choice</td>
<td>49.3¢</td>
<td>12.393¢</td>
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<td>-</td>
<td>-</td>
<td>601–999 kWh per month</td>
<td>-</td>
<td>No</td>
<td></td>
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</tr>
</tbody>
</table>

*THE FOLLOWING PLAN IS AVAILABLE TO ELIGIBLE CUSTOMERS AFTER A TRIAL OF 90 DAYS ON ONE OF THE SAVER CHOICE PLANS.*

Source: (APS, 2019).
Summary of Important Ingredients to Tailoring Rates and Options to Customers

- Updated cost of service studies are still a crucial foundation for rate design
- Principles of regulated rate design
- Understanding customer behavior and preferences
- Designing and testing rates that meet rate design objectives and create meaningful choices for customers
- Customer education and outreach, and rate comparison tools
- Using technology to make it easier for customers to understand price (or other) signals, and to respond to them
- Taking the leap to implement rates, with a transition period if needed

Now can dig deeper with smart meter data analysis, conjoint analysis, etc.

OG&E found that customer education was crucial to customers adopting the preferences they expressed

Apps, webware, etc.


Ms. Mariko Geronimo Aydin, a Senior Associate in The Brattle Group’s San Francisco office, has almost fifteen years of experience in analyzing the policies and economics of electricity system planning, regulation and de-regulation of electricity supply, and wholesale electricity markets across the U.S. Her more recent work has focused on finding sustainable and creative ways to adapt traditional planning processes and analytical tools to an industry rapidly shifting towards cleaner and more scalable supply technologies. Today’s electricity industry still has untapped potential to meet goals of clean energy, cost-effectiveness, and operational and planning flexibility through greater electricity customer engagement, cutting-edge data analysis, and new technologies. To reach this potential with a robust and modern grid, Mariko works with clients to explore options for evolving utility business models, customer choice, and wholesale market refinements that can make the best use of distributed and customer-driven power supply resources, in synergy with more traditional resources.

Mariko holds a B.S. in Economics and an M.A. in Applied Economics from Northeastern University in Boston, Massachusetts.

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