Rate Design for the Digital Age

PRESENTED TO
CRRI - Rutgers University
32nd Annual Western Conference

PRESENTED BY
Mariko Geronimo Aydin
Prepared with Ahmad Faruqui

June 28, 2019

THE Brattle GROUP
What Has Changed?

The “one size fits all” design of traditional retail rates ignores:

- Advanced meters, customer surveying techniques, and data analytics are making it easier to observe a diversity in customer preferences and behavior.
- Green energy, smart home tech, smart appliances, EVs and storage are fundamentally changing what customers look for in electricity services.
- Communication technology, webware, and apps are making it possible to engage customers on short notice and with complex shopping decisions.

As a consequence, traditional rates leave some customers increasingly dissatisfied, incentivize them to shop and bypass the utility for services, and contribute to unfair and unsustainable cost allocation.
Modern tools and technologies can also *address* the problem, by achieving Bonbright's core principles at a deeper level.

Economic Efficiency: Cost-Reflective Rates

Shopping and/or flexible customers need to see the cost implications of their choices and behavior, but, for many utilities, residential rates and costs are grossly misaligned.

Cost Categories

**Variable (¢/kWh)**
- Fuel
- Operations & Maintenance

**Demand (¢/kW)**
- Transmission & distribution wires capacity
- Generation capacity

**Fixed ($/customer)**
- Metering & billing
- Overhead

Utility Costs

- **Variable** = $45
- **Demand** = $50
- **Fixed** = $25

Customer Bill

- **Variable** = $115
- **Fixed** = $5
Example of Increasingly Cost-Reflective Rates

Customer pricing should reflect (a) what cost categories they have control over, and (b) how their usage patterns impact those costs.

<table>
<thead>
<tr>
<th>Utility Costs</th>
<th>Traditional Bill</th>
<th>3-Part Rates</th>
<th>Time-Based Variable</th>
<th>Time-Based Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable = $45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demand = $50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed = $25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Potentially reducible costs, by reducing or shifting time of actual consumption.
Equity: Customer Segmentation

- Rate classes define customer groups within which:
  - Rate structure reflects common energy usage patterns
  - Some cost-sharing is viewed as appropriate

- Traditionally residential, small commercial, large commercial

- New rate classes are emerging:
  - Distributed generation among residential customers
  - Electric cars and storage
  - Others?

- But within each class, rates must still be cost-reflective
Equity: More Meaningful Customer Segmentation with Smart Meter Data

Rate design and rate options can be better tailored as usage data is becoming more granular and more abundant.

LBNL Analysis of Smart Meter Data: Representative Customer Load Shapes

1. Flat/unoccupied
2. Solar
3. Morn/work/eve
4. Out for lunch?
5. AC dominated?
6. Active at night?

Source: Cappers, Peter and Annika Todd, “Taking Advantage of Smart Meter Data: Combining Behavioral Economics with Data Science Analytics, Lawrence Berkeley National Laboratory, April 24, 2018.
Revenue Adequacy and Stability

Cost-reflective rates ensure that customers who shop away take their share of costs with them.

Decoupling ensures that the utility is not unfairly vulnerable to forecasting error in kWh sales.
Choice of Bill Stability vs. Dynamic Pricing

Some customers are either not able to respond to dynamic pricing signals or are not interested. Modern tools can both identify nuances in customer preferences and enable utilities to offer tailored choices.

Customer Choices Among Pricing Plans (2013)
Residential Customers

Source: Direct Testimony of Bryan J. Scott on behalf of Oklahoma Gas and Electric Company, Before the Arkansas Public Service Commission, Docket No. 16-052-U, August 26, 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.
Customer Satisfaction

Customer centricity and customer interaction is becoming increasingly important for electricity services.

Service providers must use modern tools and methods to:

- Understand customer needs and preferences via market analysis
- Offer meaningful choices and options
- Engage customers so they understand their choices and how to get the best out of their selected plan
- Observe actual customer choices and behavior, and learning from it

Energy supply and services that are determined “top down” are not nimble or tailored enough to meet customer needs.
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.

The views expressed in this presentation are strictly those of the presenter and do not necessarily state or reflect the views of The Brattle Group, Inc. or its clients.
About Brattle

The Brattle Group provides consulting and expert testimony in economics, finance, and regulation to corporations, law firms, and governments around the world. We aim for the highest level of client service and quality in our industry.

OUR SERVICES
- Research and Consulting
- Litigation Support
- Expert Testimony

OUR PEOPLE
- Renowned Experts
- Global Teams
- Intellectual Rigor

OUR INSIGHTS
- Thoughtful Analysis
- Exceptional Quality
- Clear Communication
# Our Practices and Industries

## Energy & Utilities
- Competition & Market Manipulation
- Distributed Energy Resources
- Electric Transmission
- Electricity Market Modeling & Resource Planning
- Electrification & Growth Opportunities
- Energy Litigation
- Energy Storage
- Environmental Policy, Planning and Compliance
- Finance and Ratemaking
- Gas/Electric Coordination
- Market Design
- Natural Gas & Petroleum
- Nuclear
- Renewable & Alternative Energy

## Litigation
- Accounting
- Analysis of Market Manipulation
- Antitrust/Competition
- Bankruptcy & Restructuring
- Big Data & Document Analytics
- Commercial Damages
- Environmental Litigation & Regulation
- Intellectual Property
- International Arbitration
- International Trade
- Labor & Employment
- Mergers & Acquisitions Litigation
- Product Liability
- Securities & Finance
- Tax Controversy & Transfer Pricing
- Valuation
- White Collar Investigations & Litigation

## Industries
- Electric Power
- Financial Institutions
- Infrastructure
- Natural Gas & Petroleum
- Pharmaceuticals & Medical Devices
- Telecommunications, Internet, and Media
- Transportation
- Water
Our Offices