Understanding a Utility’s Cost Structure and Impact on Current Rate Topics

Presentation by Utility Financial Solutions, LLC

Dawn Lund
Vice-President
Utility Financial Solutions
dlund@ufsweb.com
Utility Financial Solutions, LLC

• International consulting firm providing cost of service and financial plans and services to utilities across the country, Canada, Guam and the Caribbean
• Instructors for cost of service and financial planning for APPA, speakers for organizations across the country, including AWWA.
• Hometown Connections preferred vendor
Overview of the Rate Setting Process
Why is Cost of Service Important?

Cost of service is:

- A method to equitably allocate the revenue requirements of the utility among the various customer classes of service

- What revenues should I recoup from whom and how should I do it?
Three Important Objectives of COS

- Ensure rates recover costs to provide service to customers (Revenue Requirements)
  - Including depreciation and rate of return
- Defines optimal rate structure
  - Customer Charge
  - kWh Charge
  - Demand Charge
  - Power Cost Adjustment
- Reduce cross-subsidization between classes
Cost of Service and Customer Classes
Why Costs Vary by Customer Class

- Costs vary because customers use electricity differently – try group according to similar usage
  - Residential, Commercial, Industrial

- Delivery of electricity consists of mainly four components:
  - Power Supply
    - Local Production
    - Purchases
  - Transmission
  - Distribution System
  - Customer Specific Costs
Basic Overview of Electric System

Color Key:
- Red: Generation
- Blue: Transmission
- Green: Distribution
- Black: Customer

Generating Station
- Generating Step Up Transformer
- Transmission Customer 138kV or 230kV
- Transmission lines 765, 500, 345, 230, and 138 kV
- Substation Step Down Transformer
- Subtransmission Customer 26kV and 69kV
- Primary Customer 13kV and 4kV
- Secondary Customer 120V and 240V

Customer Service, Meter Reading
Power Supply Costs by Class of Customer

- Demand related power costs
  - Some customers contribute a greater amount to the peak demands of the system.

- Energy related power costs
  - Power costs can vary by season or time
  - Some customers use more energy during on-peak hours
Load Data Example

![Graph showing load data example]
Distribution Costs

- Identifies the cost to operate and maintain the distribution infrastructure
- Customers are served at different voltage levels:
  - Sub transmission – Customer avoids all the distribution system infrastructure
  - Primary Voltage – Customer owns transformer and service drop
  - Secondary Voltage – Uses all the infrastructure of the distribution system
Relationship of Coincident to Non coincident Peak Demands

![Graph showing the relationship between load and hours for different classes and system peak.](image)
Customer Charges

- Costs that do not vary with usage:
  - Meter operation, maintenance and replacement costs
  - Meter reading
  - Billing Costs
  - Customer Service
  - Portion of Distribution System (35–50%)
Overview of a Electric Cost of Service Study

FUNCTIONALIZATION

Total Expenses
Production
Transmission
Distribution
Customer

CLASSIFICATION

Demand Related
Residential
Commercial
Industrial

Energy Related
Residential
Commercial
Industrial

Customer Related
Residential
Commercial
Industrial

ALLOCATION

Residential Rate
Commercial Rate
Industrial Rate

Note: Demand costs may be subcategorized between coincident peak and non-coincident peak demand
All Rate Designs have Positives and Negatives

- For each strategic objective and rate design under review, the Governing Board needs to understand the positives and negatives to make informed decisions and to reduce the chances of an unexpected result.
A Few Rate Design Options

- Flat Rate Structures – Easy to understand and administer
- Declining Block Rate Structures – Can create the most revenue stability
- Inclining Block Rate Structures –
  - Usually a 25% rate differential in blocks for customers to respond
- Distributed Energy Resources
## Rate Designs
### Simplified Example

<table>
<thead>
<tr>
<th></th>
<th>Monthly Charge</th>
<th>First 500 kWh</th>
<th>Over 500 kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat</td>
<td>$ 10.00</td>
<td>$ 0.08</td>
<td>$ 0.08</td>
</tr>
<tr>
<td>Declining</td>
<td>10.00</td>
<td>0.09</td>
<td>0.07</td>
</tr>
<tr>
<td>Inclining</td>
<td>10.00</td>
<td>0.07</td>
<td>0.09</td>
</tr>
</tbody>
</table>
Rate Design Options

- Flat rates
  - Typically a Monthly Customer Charge and kWh Charge
  - Some concern from City Councils and Environmental Groups
Rate Design Options

- Declining block rates recover fixed delivery charges as quickly as possible
  - Creates more financial stability for the utility
    - Do not generally reflect marginal costs of power production
    - Rate does not promote energy conservation
    - Reduces the savings to customers who implemented energy efficiency programs
    - Social concern over impact on low use customers
Inclining block rate designs are creating problems with Financial Stability and many utilities are modifying or flattening the rate

- Many Inclining block rate structures shifted to much of the fixed cost recovery into latter blocks adversely impacting utility financial statements
- Cannot cost justify large rate block differentials
- Large differential may result in under-recover of costs if customers respond
Time of Day Differentiation

- **Advantages**
  - Can more closely track costs if signal sent from power supplier
  - Gives price signals brackets

- **Disadvantages**
  - Metering
  - Require more customer attention
  - Cost differential between time periods may not be large enough to off-set administration/billing costs
Seasonal Differentiation

Advantages
- Generally tracks production or purchased power supply costs
- Improved price signal
- Generally simple to administer

Disadvantages
- Budget Billing option hides price signal
Distributed Energy Resources
Difference in Resources
Sample System Load Curve

Average Usage by Season and Hour (MWH's)

Graph 2

- 1,000.00
- 800.00
- 600.00
- 400.00
- 200.00

S
INTER2
INTER4
Solar Production Curve (Sample)
Wind Production Curve (Sample)
Each customer in the residential class used energy an awful lot like the next – utilities could lump energy and demand elements together into $/kWh price.

Today residential customers are not the same. Smart thermostats, plug-in electric vehicles, rooftop solar, and myriad of other technologies that make their loads and consumption patterns potentially very different.
Comparison of Fixed and Variable

Typical Residential Summer Customer
(Average monthly consumption = 798 kWh's)

Cost of Service
- Fixed, $33.90
- Variable, $70.91

Revenue Received
- Fixed, $14.90
- Variable, $91.57
Comparison of Fixed and Variable After Net Metering

Typical Residential Summer Customer
Installation of 5kW PV

Revenue:
- Variable, $8.34
- Fixed, $14.90

Cost of Service:
- Variable, $14.55
- Fixed, $30.63

Comparison with Utility that Purchases Power Supply
- PV unit installation – 5kW
- Midwest PV Unit – 2013 data
- PV production – 725 kWh
- Customers Peak Distribution Demand – Before PV: 5.16 kW; after PV: 3.59 kW
- Customer Peak to System Demands – Before PV: 2.11 kW; after PV: 0.61 kW
Whenever subsidies occur, it will cause problems in the future.
- Customer has relied on the price signal to install the solar unit
- At some point the subsidy will need to be removed

Billing and Metering Options (Depends on metering and billing capabilities) for avoided cost recovery
Avoided Cost Recovery

- Avoided Cost recovery
  - Measures how solar reduces energy and capacity on power supply side, as well as long run marginal cost on distribution system (reduce need for capacity addition)
Avoided Cost Recovery

- **Net metering with additional charge for distribution recovery**
  - Difference between what they take off the system and what they give back. (1,000 take, gave 600, billed 400)
  - Additional charge for distribution under recovery
  - Can be negatively viewed by customer, “why am I paying more?”

- **Buy all sell all (two meters)**
  - Took 1,000, gave back 600, solar produced 800. (Solar metered separately)
  - House used 1,200 (1,000+800−600)
  - Billed retail at 1,200; credited avoided cost at 800

- **Net Billing**
  - Took 1,000, gave back 600. Billed retail at 1,000 and avoided cost credit at 600.
“Ideal” Rate Structure

<table>
<thead>
<tr>
<th>Example &quot;Ideal&quot; Rate Structure</th>
<th>EXAMPLE Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply Customers Demand Coincident with System Peak</td>
<td>$ 12.72</td>
</tr>
<tr>
<td>Distribution Recovery Based on Customers Maximum Demand</td>
<td>2.19</td>
</tr>
<tr>
<td>Energy Charge (Seasonal, TOU)</td>
<td>0.0442</td>
</tr>
<tr>
<td>Customer Charge</td>
<td>21.44</td>
</tr>
<tr>
<td>PILOT</td>
<td>7%</td>
</tr>
</tbody>
</table>

This is an example rate structure, the specific numbers under this structure needs to be determined for your utility from a cost of service study.
Relationship of Coincident to Non coincident Peak Demands
“Ideal” Rate Strategies

- Small periodic increases to keep up with inflation
  - 0–5% – inflationary
  - 5–9% – a few large industrials
  - Double digits = complaints
- Phase in large increases over time
- When possible, implement Increases in the transition month = Transparent
- Survey of local rates (positive and negative)
  - Structure apple to apples?
Power Cost Adjustments (PCA)

Rate Structures Ability to Mitigate Changes in Power Supply Costs
(PCA) Power Cost Adjustment

- Automatic kWh charge that is passed-through to customers for increasing power costs
- Used by about 60% of the municipal systems and most investor owned
- Limits utilities expense risk (PP 60-80% O&M)
  - Does not limit board control of rates, concentrate on things more likely in their control – distribution and admin related (20% – 40%)
- Reduces amount and frequency of rate adjustments
Questions?

Dawn Lund
Vice-President
Utility Financial Solutions
231-218-9664