Best Practices and Industry Trends in Rate Design to Encourage Energy Efficiency

There is no unanimous opinion about what constitutes rates that encourage energy efficiency. The rate design depends on the goal of the utility (reducing overall use versus shifting use off-peak and/or providing revenue stability), and the sophistication of the consumers. What follows is a summary of current industry trends and rate design options that encourage energy efficiency.

Current Industry Trends:
- Increasing demand charges to recover distribution costs
- Decreasing demand charges for power supply cost
- Volatility in power supply markets is resulting in more utilities using power cost adjustments
- Due to the economy, utilities are exploring economic development rate
- Movement toward residential inclining block rate designs
- Time of use rates becoming more widespread
- Revenue Decoupling

Optimal retail rate structure follows Marginal Cost structure:
- Fixed customer charge
- Fixed distribution facilities charge per kW or kVA of design demand
- Energy charges:
  - Inclining Block Rates
  - Time-differentiated energy (and possibly demand) charges:
    - Seasonal Rates
    - Time-Of-Use pricing
    - Critical Peak Pricing
    - Real-Time Pricing

All of these are discussed in more detail below.

**Fixed Customer Charge**

- Designed to recover customer-related costs that do not vary with usage
  - Meter Costs
  - Meter Reading Costs
  - Billing Costs
  - Customer Service
  - Service Drop
  - Portion of Distribution System

**Fixed Distribution Facilities Charge**

- Designed to recover distribution costs. Separate from energy charges.
- Recover capacity-related costs on the basis of customer’s peak (15-minute, 30-minute, or hourly) demand during the month (or during a particular pricing period within the month) or installed capacity kVA.
- Customer’s peak demand may not coincide with high-cost hours during the month (or during the pricing period).
- kW demand charges give customer limited incentive to control demand once peak for the month has been set.
- kVA cannot be influenced by customer behavior and, thus, results in more stability but no incentive to limit peaks (except in construction phase).
- Demand charges can be confusing to customers.

**Inclining Block Rates**

- Make sense if charging marginal cost would produce too much revenue--reduce price in the early blocks and keep the tail block at full marginal cost.
- Typically justified as a means to give subsidies to smaller users.
- Sends energy conservation signal.

**Benefits:**
- Can reduce overall energy consumption.
- Do not require additional infrastructure – easy to implement.

**Costs/Concerns:**
- Low income customers with larger (possibly rented) homes may not be able to respond to price signals.
- May instead encourage fuel switching (e.g., natural gas), a less desirable outcome.
- Reduced utility revenue, increasing costs for other customers.

**Seasonal Rates**

- Higher rates in peak season that reflect a higher cost of energy
- Well suited to climates with distinct seasonal demand
- Peak season dependent on region, timing of peak demand and wholesale market
  - E.g., Southwest – summer is peak; Midwest – summer and winter peaks; Hawaii – little variation
  - Maybe not as applicable for the Pacific Northwest
  - Differential would ideally reflect variations in wholesale electricity value.
  - Could be inflated to provide greater incentive to reduce peak.
- Often are combined with Time-of-Use rates.

**Benefits:**
- No new infrastructure needed – easy to implement and easy for customers to understand.
- Rates are predictable.
- Shape seasonal consumption.
- Provide incentive to conserve in high cost seasons.

**Costs/Concerns:**
- Not many customers are able to shift their use across seasons.
- Customers unable to shift load to off-season or reduce use would be hit with a higher bill
  - Increased risk of revenue volatility

**Time-of-Use Rates (TOU)**

- Variable rates based on time-of-day. Definition of peaks can vary.
- Requires more complex metering.
- Cost-effective if metering costs are not too high and load shifts from peak to off-peak are possible.
- Differential between rate period should correlate to average hourly electricity costs
  - Could be inflated to provide greater incentive to reduce peak consumption.
- 2.7% (775,000 +) customers in WECC are on residential TOU rates.

**Benefits:**
- Most customers can shift usage out of peak periods, or reduce use in peak hours.
- Predictable, even less sophisticated customers (residential and small commercial) would likely understand.

**Costs/Concerns:**
- Can increase costs for customers who cannot shift load (e.g., retail stores).
- Metering and billing infrastructure must support hourly tracking of load.
- Greater rate complexity.
- Possibly increases revenue uncertainty.

**Critical Peak Pricing (CPP):**

- CPP allows utility to increase rates on short notice (often 1 day) for a defined period (often several hours) a given number of times/year (6 or 10 or 12). In exchange customers get a discount in other periods.
  - Example: PGE and SMUD.

**Benefits:**
- Decreasing demand in critical periods which may help utilities keep their costs lower.
- Preserves reliability during crisis.
- Low cost impact on non-participants.
- Allows utilities to reduce risk from highest electricity costs.

**Costs/Concerns:**
- Requires AMI.
- May require sophisticated customers who can respond quickly (unless appliances are automated and linked to price signals but have higher up-front costs).

**Real-Time Pricing:**

- The hourly real-time price is the expected hourly marginal cost.
- The ultimate price signal and load-management tool.
- Rates adjust based on fluctuations in the wholesale electricity costs. Fully matches wholesale costs with energy rates--very good price signal.
- Rates are unpredictable so these programs tend to target large customers who can manage risk and consumption.

**Benefits:**
- Rates fluctuate more than under any other rate design and increases incentive to reduce consumption during peak periods.
- Passes wholesale electricity cost risk to the customer.

**Costs/Concerns:**
- Requires AMI meters.
- Greater rate complexity.
- Customers cannot predict their costs.
- Administrative cost is significant.
- Customer response to changing prices may be difficult to predict.
Sources: