Ratemaking Trends: Stranded Investments and Distributed Generation

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Trends in Retail Rate Design

- Movement in the direction of Cost-Based Rates
  - Traditional 2 part rates (Customer/Energy) being transitioned to 3 part (Customer/Energy/NCP Demand) or 4 part rates (Customer/Energy/CP Demand/NCP Demand)
  - Advancements in metering technology are making these rates much more feasible which allows rates to be developed addressing many of the concerns associated with Distributed Generation
- Greater emphasis on time-of-use/time-based pricing (both energy and demand)
  - Utilities and regulators looking to provide incentives to customers to reduce consumption in higher cost periods
  - Optional Time of Use and Demand Rates
- Interest in Standby and All-in Distribution / Straight Fixed Variable Rates

Distribution Cooperative Costs

- Purchased Power Costs
  - Energy component is variable based on members' kWh use (energy efficiency, customer owned generation)
  - Demand component is variable as members shift usage to off-peak periods in response to financial incentives (time of use and demand rates)
- Distribution costs
  - Almost totally fixed costs (less opportunity for incorporation into time of use rates)
  - Emphasis is how to fairly recover these fixed costs
  - Costs that could become "stranded" with adoption of DG

Fixed Cost

- Fixed cost - a cost that does not vary with sales levels
  - Non-volumetric fixed costs are costs that occur regardless of demand or usage level
  - Volumetric fixed costs are costs related to the demand that the customer places on the system
  - Once these costs have been incurred, the level of these costs cannot be changed and the focus shifts to cost recovery

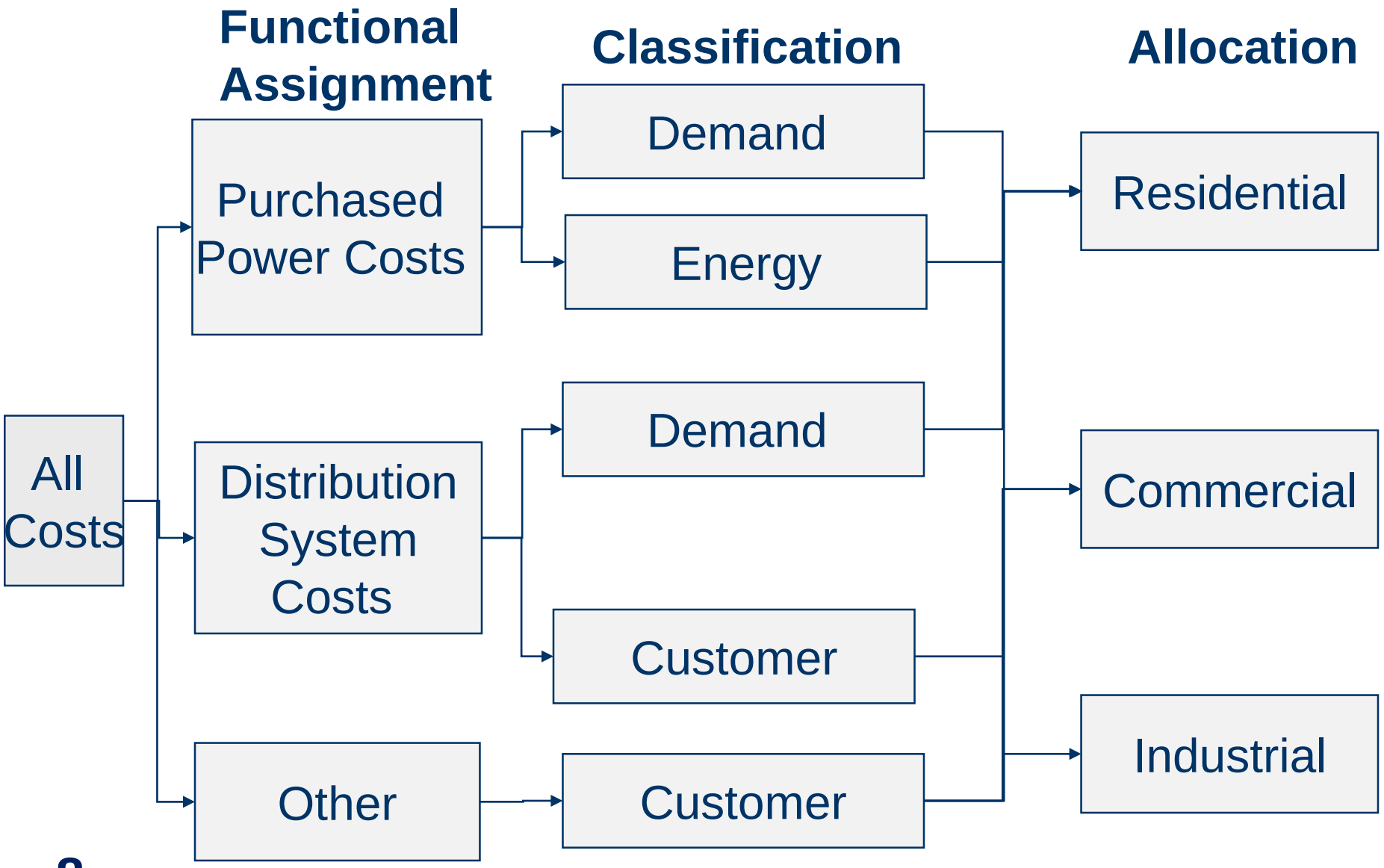
Equitable Cost Recovery

- Based on the principle that if a customer causes a cost to be incurred by the cooperative, the customer should pay that cost
- Begs the question “What customer actions cause costs to be incurred?”
- The ideal time to determine this is when your cooperative performs a cost of service study which identifies the drivers for the various costs that cooperatives incur and use these cost drivers to fairly allocate costs

Major Cost Drivers

- Energy related costs vary with the consumption of energy
- Demand related costs vary with the capacity requirements of customers
  - Coincident peak demand for generation and transmission capacity (heavily time dependent)
  - Non-coincident peak demand for distribution capacity
- Customer related costs vary with the number of customers served

Cost of Service Study



Recovering Fixed Costs

- Fixed costs can be recovered through rates paid by customers over time
  - Depreciable life, and thus the full cost recovery period, for distribution equipment is typically between 30 and 35 years
- Fixed costs can also be recovered through an up front contribution in aid of construction, in which case they don’t need to be recovered through rates

Distribution Fixed Cost Recovery

- The goal is to recover fixed distribution costs as fairly as possible from both large and smaller usage customers and high and low load factor customers
  - Non-volumetric fixed distribution costs should be recovered through a fixed charge that does not vary with usage (fixed monthly customer charge)
  - Volumetric fixed distribution costs should be recovered through an NCP demand charge that is based on the member's capacity requirements

Rate Design Principles

- Rates should be fair and equitable for all customers
- Customers should pay the costs that they impose on the system
- Recover fixed costs through fixed charges
- Recover variable costs through variable charges

Stranded Costs

- A major problem with the traditional, 2 part rate design arises when fixed distribution costs are “variablized” and customers decide to self-generate
- When members generate their own energy and kWh usage is reduced, the “variablized” fixed distribution costs go unrecovered, resulting in what’s popularly known as stranded costs
- These uncovered fixed distribution costs are ultimately borne by customers who do not own generation

Stranded Cost Example

- Cost of service results:
  - Customer related costs and margins are $30.25/meter/mo.
  - Non-customer-related costs and margins are $0.09250/kWh

Stranded Cost Example Continued

- Usage
  - 275,591 customer months
  - 176,177,287 kWh
- Rate design
  - $18.00 per meter per month
  - Per kWh - $0.105/kWh

Stranded Cost Example Continued

$30.25 - $18.00 = $12.25 / meter / month

$12.25 x 275,591 = $3,375,990 in fixed costs and margins that are variablized

$ 3,375,990 / 176,177,287 kWh = $0.01916/kWh in fixed cost and margins recovered through energy

Stranded Cost Example Continued

- System Access charge is $12.25 too low
- Energy charge is $0.01916/kWh too high
  - Customers buying large amount of kWhs are paying more than their fair share of fixed costs and margins
  - Customers buying small amount of kWhs are paying less than their fair share of the fixed costs necessary to provide a minimum system
    - Includes customers who install DG, every kWh they self-generate “strands” 1.916 cents of customer-related fixed cost

Stranded Cost Example Continued

- Demand-related costs of 2-3 cents per kWh are also not recovered
- With a standard two-part rate (Customer/Energy) the demand-related portion of fixed cost is “unprotectable” until you move to a three or four-part rate or look at an exotic way recovering costs like Straight Fixed Variable rate design

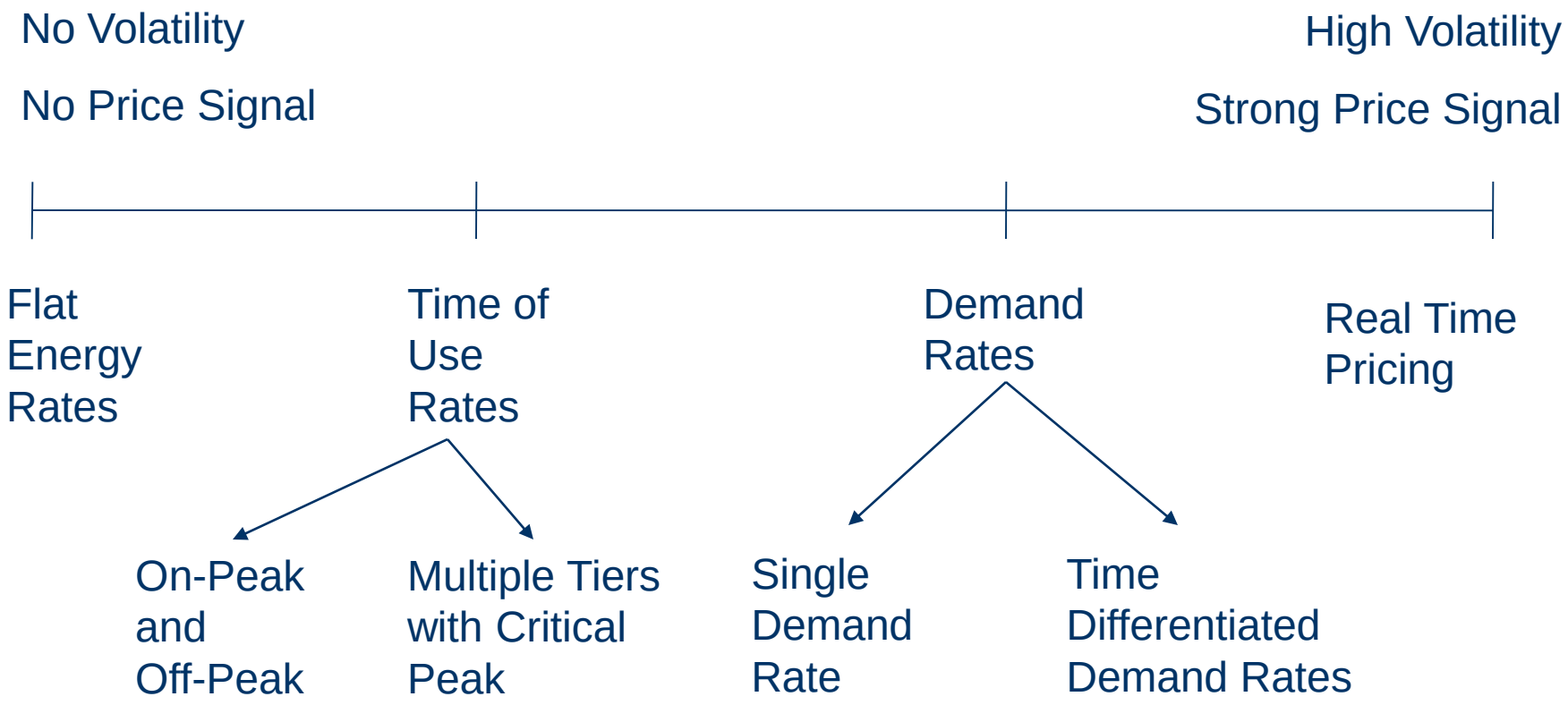
Cost Based Rates

- Accurately reflect the unit costs from the cost of service study
- Recover fixed costs through fixed charges
  - Increase customer charges and demand charges
- Recover variable costs through variable charges
  - Reduce energy charge to eliminate fixed costs that were formerly recovered there

Advanced Metering allowing more rate options for all customers

- Dramatic decreases in the costs of advanced metering systems have opened up rate design options that historically have only been available to larger C&I customers
  - We're seeing cooperatives adopt AMI systems far more rapidly than Investor-owned & Municipal utilities
- Functionality improvements provide operational benefits which can improve cost/benefit ratio when evaluating purchasing of AMI systems
  - Avoid meter reading costs, remote disconnect/reconnect, fault detection, etc.

The Rate Continuum



Three Part Rate

- Customer/Access Charge
- Energy Charge
  - Recovers the energy-related purchased power costs from G&T and any associated variable O&M
- Non-coincident Peak (NCP) Demand Charge
  - Recovers purchased power demand-related costs from wholesale supplier
  - Recovers demand-related costs associated with distribution system installed to meet customer's maximum demand requirements

Pros/Cons to Three Part Rate

- Pros
  - More appropriately reflects how costs are incurred by the cooperative
  - Reduces the likelihood of stranded or “shifted” costs associated with installation of DG & Energy Efficiency
  - Adapts to different load characteristics much better than two part rates
- Cons
  - Can have large impact on seasonal and low-load factor customers (irrigation, grain-drying, ski areas, etc)
  - Can be difficult to understand for Residential/Small Commercial customers without communication

Four Part Rate

- Customer/Access Charge
- Energy Charge
  - Recovers the energy-related purchased power costs from G&T and any associated variable O&M
- Coincident Peak (CP) Demand Charge
  - Recovers purchased power demand-related costs from wholesale supplier
- Non-coincident Peak (NCP) Demand Charge
  - Recovers demand-related costs associated with distribution system installed to meet customer's maximum demand requirements

Pros/Cons to Four Part Rate

- Pros
  - Most appropriately reflects how costs are incurred by the cooperative and is non-discriminatory to all customers
  - Reduces the likelihood of stranded or “shifted” costs associated with installation of DG & Energy Efficiency
  - Adapts to customer load characteristics better than most any rate design
- Cons
  - Can have large impact on seasonal and low-load factor customers if they cannot shift load away from peak
  - Can be difficult to understand for Residential/Small Commercial customers without communication

Sample Four Part Rate

Coincident Peak Demand rate : **$12.38 / kW**

Non-Coincident Peak Demand rate : **$3.25 / kW**

Energy rate : **4.008¢ / kWh**

Customer charge = **$10.75**

Peak Period: April – October: 1pm – 5pm

November – March: 7am – 11am

And you reckon it's cheaper to leave it running all the time?

Basis for Time Differentiated Rates

- The cost of serving load differs substantially over time
- Fixed cost per kWh varies over time as different generating units and technologies are required to meet customer needs
- Variable cost per kWh varies over time as different fuel sources are used to meet customer needs (coal, nuclear, gas, wind, solar)

Reasons for Offering Time Differentiated Rates

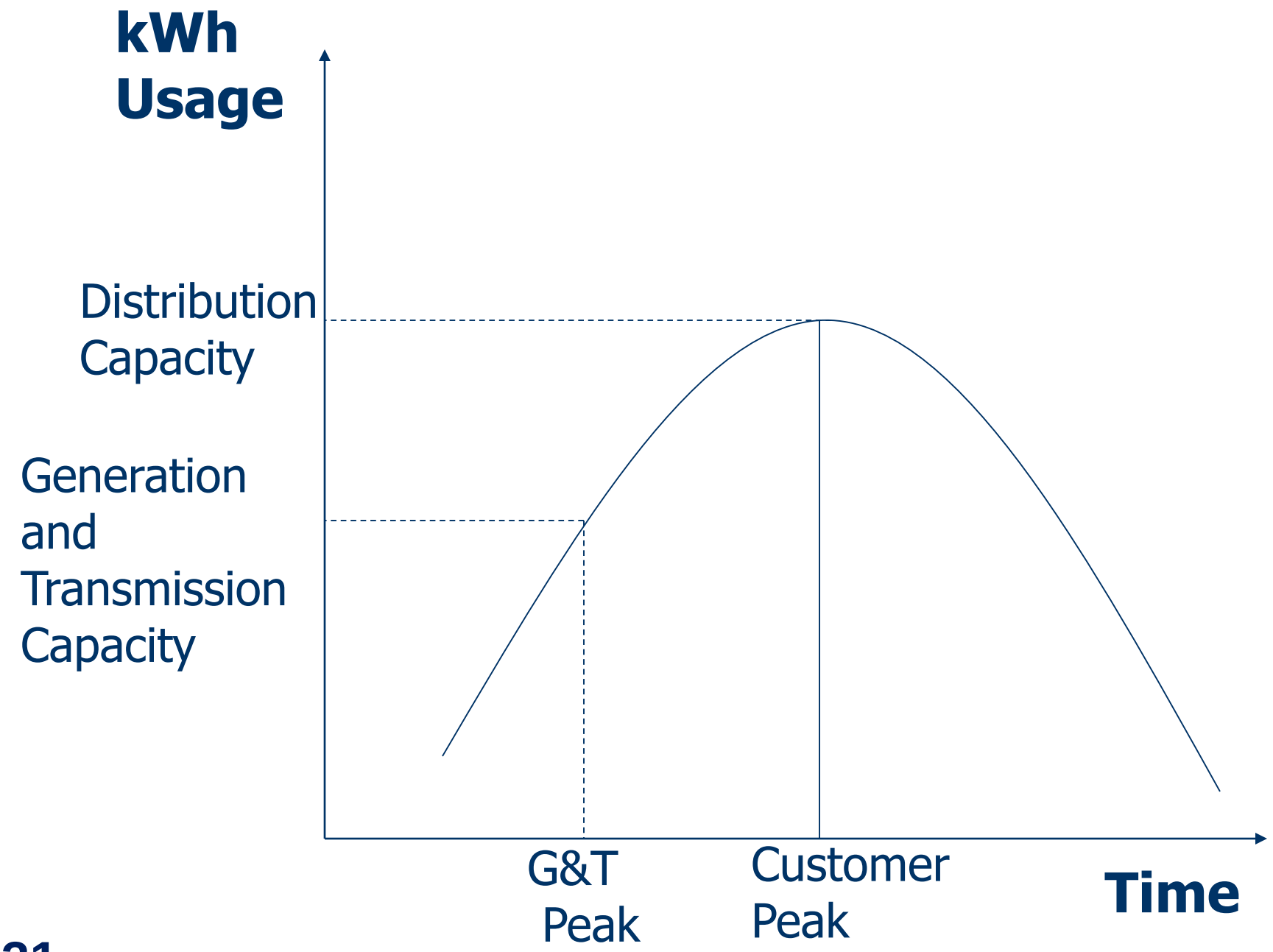
- Provides utilities with an opportunity to reduce costs by providing a financial incentive for customers to shift usage to time periods that are less costly to serve
- Sends a much better price signal than flat energy rates
- Provides customers with opportunity to manage their energy bill in a time of rising prices
  - Provides customers (including DG) with choice

Obstacles to Time Differentiated Rates

- Opportunities for time differentiating retail rates can be limited by the rate structure of the power provider:
  - NCP billing
  - “Tilted” demand charges (fixed costs shifted to energy charge for recovery)
  - Demand ratchets
  - Average demand components (kWh/hours)

Developing Time of Use Rates

- Identify peak period using 10 years of monthly data that shows when the utility actually peaked or paid a demand charge to its supplier
- Turn CP demand charges into on-peak retail rate differentials
- Energy charges can be time-differentiated if G&T's energy charges are time-differentiated
- Distribution-related costs are collected in both on and off peak charges since those costs do not vary with time or usage


kWh
Usage
Distribution
Capacity
Generation
and
Transmission
Capacity
G&T
Peak
Customer
Peak
Time

Developing Time of Use Rates

- Choose the on-peak period as narrowly as possible
- Broad peak period (e.g. 7 AM to 11 PM)
  - Not very useful to customers
  - Results in small differential between on-peak and off-peak because the denominator in the calculation of the on-peak adder is large
- Flat rate results if everything is on-peak

Sample Time of Use Energy Rate

On-peak rate : **22.706¢ / kWh**

Off-peak rate : **5.571¢ / kWh**

Customer charge = **$10.75**

Peak Period: April – October: 1pm – 5pm

November – March: 7am – 11am

Communication With Customers is Critical

- In a flat rate environment, there is no financial benefit for customers to move usage to other time periods
- Need to convince customers that the game is worth playing and help them develop the skills to win the game
- Communicate the benefits in terms that are meaningful to customers
  - Avoid technical data when possible
  - Communicate the dollar savings

Convincing Customers they can save money on Time of Use Rates

- Help to identify equipment that will help customers take advantage of TOU rates
- Educate customers how to use equipment to take advantage of rates
- For example:
  - With an on-peak rate of 22.7¢/kWh and an off-peak rate of 5.57¢/kWh, a customer can save:
    - 60¢ by shifting one hour of clothes drying (3.5kW) from on-peak to off-peak (22.7¢ - 5.57¢) x 3.5 kWh
    - 31¢ by shifting one hour of dish washing (1.8kW) from on peak to off-peak

Standby Rates

- Most popular topic amongst Distribution Coops this year
  - Interest in these rates for all customers but mostly those with behind-the-meter generation
  - 100% load factor rate for distribution meaning that Coop must plan to serve all of the member's load should the DG or behind-the-meter generator go offline
    - Avoids stranded investment or costs shift to other members
  - Typically differentiated based on voltage level
  - For C&I customers this rate could also be ratcheted based on customer's highest maximum demand or an agreed to contract demand

Standby Rate Minimum Charges

- To prevent under collection on distribution facilities, many cooperatives have language regarding the minimum charges associated with the standby rate being the higher of:
  - (1) the Customer's total demand charge calculated under their standard rate schedule; or
  - (2) the demand charge calculated using the standby demand charge rate applied to the contract demand
- Ensures that the member always pays the proper amount for use of the distribution system and that the cooperative does not under-collect on standby customers when they rely on the backbone system

All-In Distribution / Straight Fixed Variable Rate Design

- All Distribution related costs & margins collected through a fixed charge per month similar to customer charge
  - Similar to cell phone plans & Amazon Prime
  - Decouples the link between revenue and energy consumption
    - Been around in the Natural Gas industry for some time
  - Aligns the interests of the cooperative & members on promotion of energy efficiency & distributed generation
- Makes some sense for distribution related costs, very risky if purchased power costs are included
  - Purchased Power costs should be a pass-through to customers & typically implemented alongside a Power Cost Adjustment mechanism

Questions?

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