Ratemaking Trends in the Utility Industry

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Trends in Retail Rate Design

- Movement in the direction of Cost-Based Rates
  - With advancements in meter technology, 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)
- Interest in demand rates for residential and small commercial customers
- States with higher concentrations of distributed generation re-evaluating Net Metering policies
  - Net Metering subsidies becoming onerous for those without caps
  - Some states looking into including benefits calculation in compensation for Distributed Generation

Trends in Retail Rate Design

- Interest in Standby, All-in Distribution / Straight Fixed Variable Rates, and updating Line Extension Policies
- Renewed interest in 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 and provide options to customers
- Utilities getting much more onboard with Community Solar
  - Allows utilities to provide customers without the financial means or the space required to construct distributed generation to become involved
  - Utility maintains control and siting of renewable facility while promoting green power and minimizing cost shifts to non-solar members
  - Various pricing methodologies to promote subscription

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

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

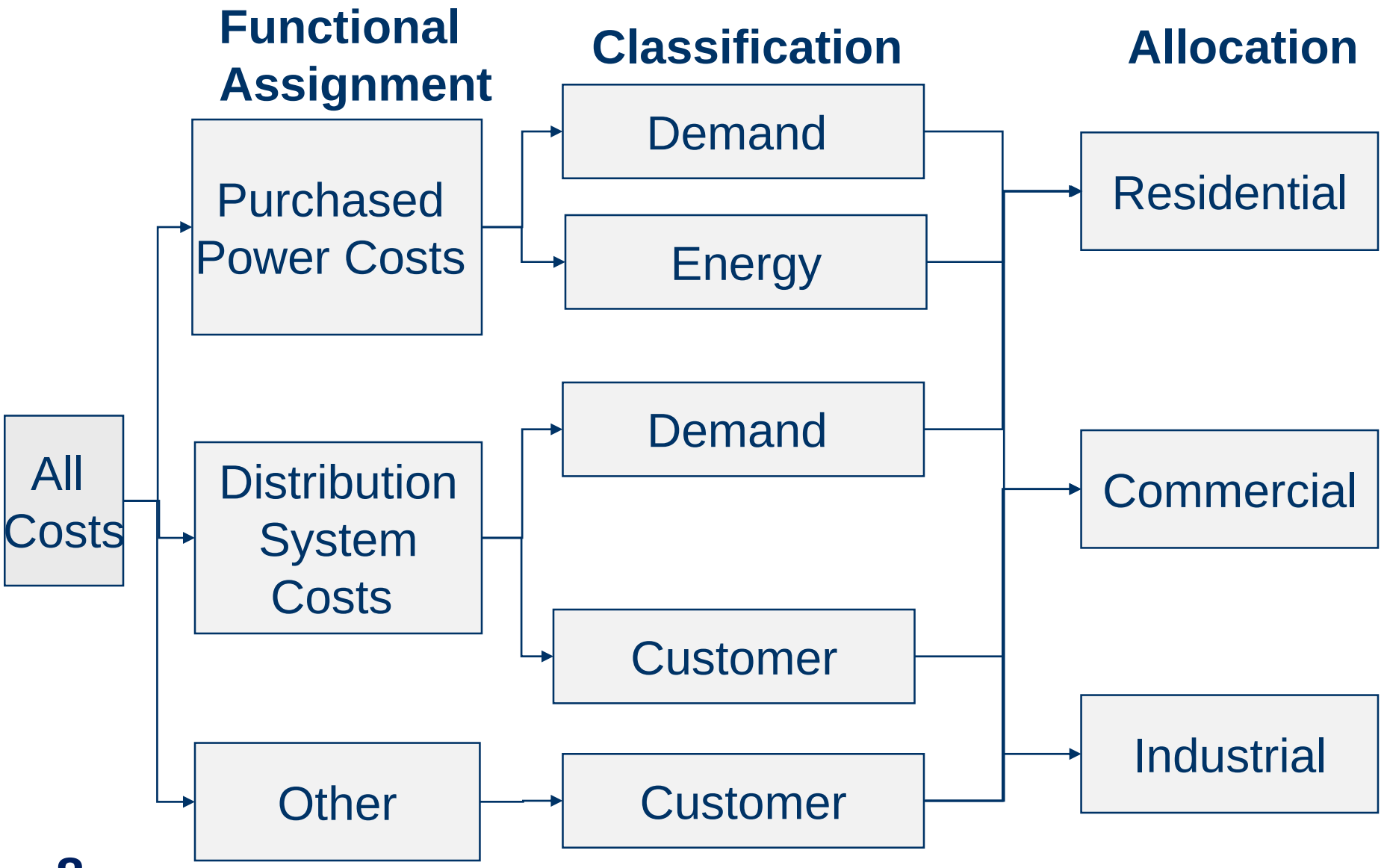
Equitable Cost Recovery

- 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



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

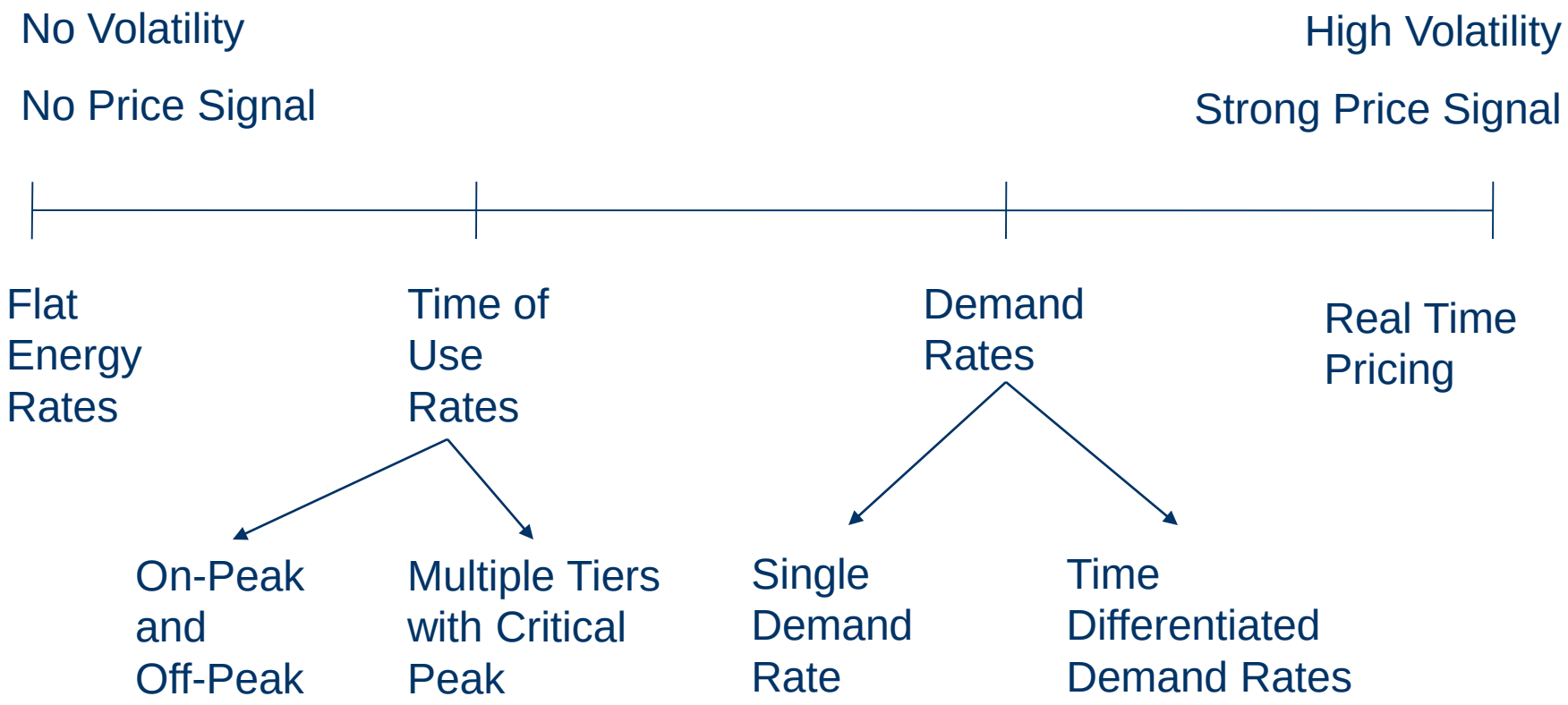
Cost Based Rates

- 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
- AMI is making it feasible to implement demand rates for residential and small commercial customers

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

Net Metering

- 43 states have Net Metering policies at varying levels
  - Most mandatory for regulated utilities, some for unregulated
- States with higher concentrations of distributed generation (Hawaii, Nevada, Arizona, etc.) re-evaluating Net Metering policies
  - Net Metering subsidies becoming onerous for those without caps
  - Looking at crediting avoided cost or marginal costs rather than full retail (Similar to PURPA)
  - Some states looking into including benefits calculation in compensation for Distributed Generation

Net Metering Definition

- Allows customers to use their own generation to offset their consumption over a billing period
- Raises issues of distribution fixed cost recovery
- It is fair to share with customers any cost savings that the utility realizes as a result of customer actions
- When a customer self generates and reduces kWh usage, what is really saved?

Two Approaches to Net Metering

- Subsidy to encourage customer investment in renewable energy technologies
- No Subsidy – straight cost-based rates
  - Customer charge to recover all non-volumetric fixed distribution costs
  - NCP demand charge to recover volumetric fixed distribution costs
  - CP demand charge to recover purchased power demand
  - Energy charge to recover purchased power energy

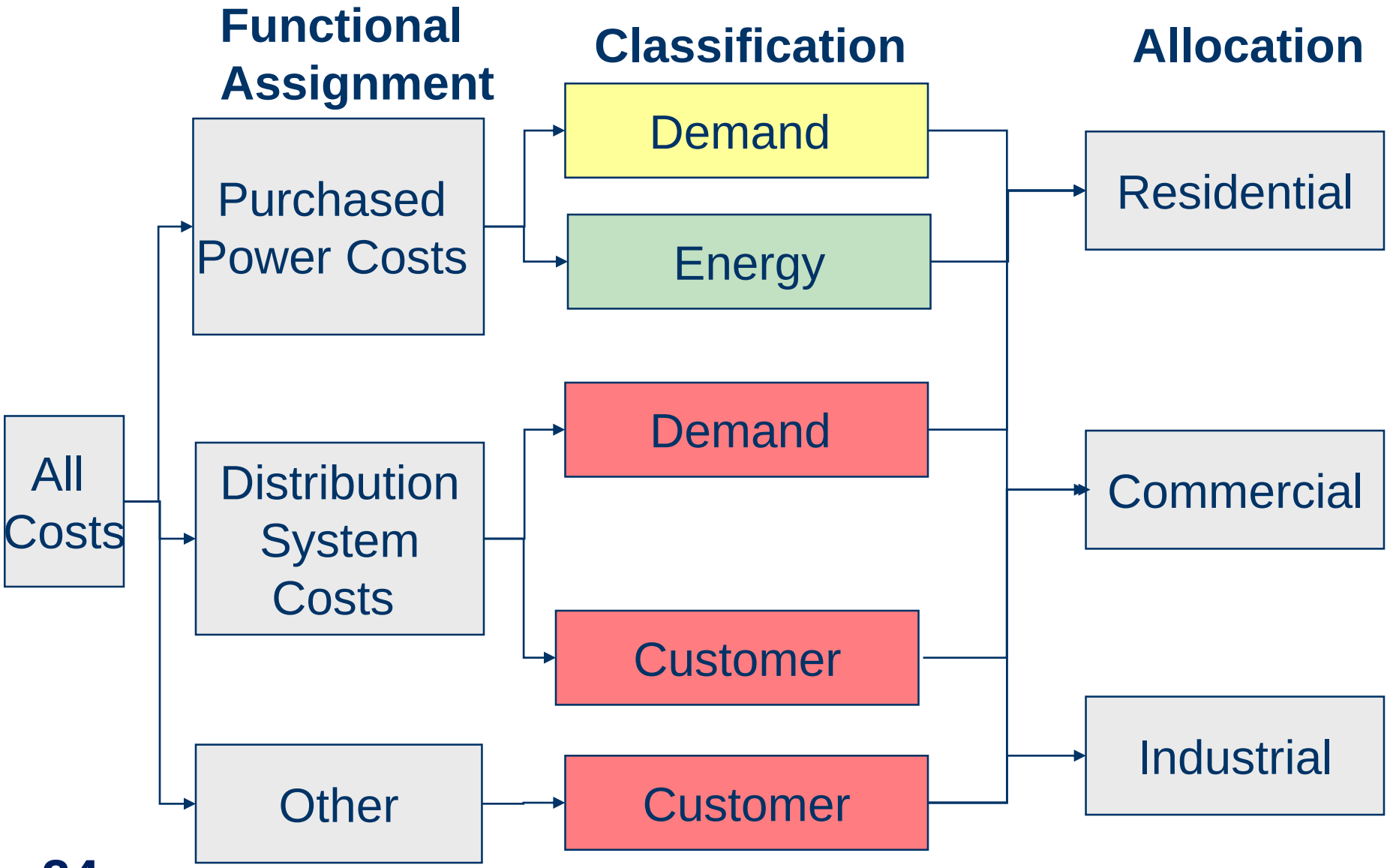
Subsidized Approach

- Subsidy is composed of:
- Any fixed distribution costs that are “variabilized”
- Any portion of the purchased power demand charge paid to the member that is not associated with member production at time of monthly peak

Net Metering Subsidy

- When a utility sells electric energy to a customer, the utility is selling 3 services
  - Generation capacity and energy
  - Transmission capacity
  - Distribution capacity
- When a customer sells to electric energy to a utility, the customer is selling 1 service
  - Generation energy and maybe some capacity

Cost of Service Study



Net Metering Compensation

- Whether the customer who owns generation receives a subsidy is determined by retail rate design
- If a customer pays full retail rate for any electric service provided by the utility and receives a payment equal to the wholesale energy charge plus a demand payment for the energy generated at the time of the peak, there is no subsidy to the customer (requires metering in both directions)

Net Metering Compensation

- A customer that owns generation receives a subsidy if:
  - Customer usage is measured by a single meter that runs both forward and backward with customer-owned generation offsetting usage
  - Customer is paid full retail rate for any excess generation above customer usage

Net Metering Benefits Evaluation

- Recent trend for supporters of renewable energy to endorse including societal benefits in the price paid to Distributed Generation customers
- Problems with including benefits in rate analysis:
  - Much more subjective criteria, value not uniform for all members
  - Tough to quantify locational “benefits” of DG
    - If distribution infrastructure is avoided, how many customers benefit? What is the deferred investment worth? Do utility records have necessary data to make this calculation?
  - Ancillary Service costs and benefits
    - Include additional standby generation costs needed to avoid duck curve?
    - Include potential increase in regulating and reactive reserves?
  - Cost of Carbon – Implied or Determined?

Net Metering Benefits Evaluation

- Some state regulatory commissions beginning to implement policies in this regard
  - “Value of Solar”, Joint Benefit studies, etc.
- NARUC working on Distributed Generation Compensation Handbook
  - This will be the most relevant material that could be used in conjunction with Cost of Service Study model to potentially include benefits into calculation of rates
- Until then, individual commissions may adopt various methodologies
  - Wisconsin has no such policy

Policy Changes on Rate Design

- Minnesota (Docket No. E999/M-14-65)
  - First state to Adopt Value of Solar Methodology
  - Gives customer with DG a choice between Net Metering or Value of Solar (VoS) when they install solar
    - Preliminary VoS credits solar owners at $13.6 cents/kWh of solar energy generated based on market price which includes environmental, avoided infrastructure, and purchased power or fuel costs (about 2 cents higher than Xcel retail rate)
      - Includes a $37 per ton of carbon adder
    - Price is “locked-in” for 25 years
    - If customer generates more power than they’re using the utility gets it for free and keep any RECs associated with VoS customers
  - Only applies to IOUs which aren’t mandated to adopt VoS

Policy Changes on Rate Design

- Hawaii (Docket # 2014-0192)
  - Pushing towards 100% renewables by 2045
    - Currently around 12% of homes have Solar
  - Ended Net Metering Program on Oct 14th, 2015
    - Grandfathered existing NEM customers
    - New Solar customers have two options:
      - Self Supply ($25 Minimum Bill, limited export credit to grid)
      - Grid Supply (Credit exported energy at fixed rates between $0.15 and $0.28 ¢ / kWh based on avoided costs)
  - Also directs utilities to develop new or expanded Time of Use tariffs allowing customers to save money by shifting demand to middle of the day to take advantage of lower cost solar energy

Policy Changes on Rate Design

- New York (Case # 14-M-0101)
  - "Reforming the Energy Vision" (REV) docket
  - Looking to establish "Distributed System Platforms" to enable two-way flows of energy, services, and value across the distribution system
  - Rate design for mass-market customers should begin to place a greater weight on the peak demand of the customer, which ties closely to the cost of the system
  - NY Utilities are tasked with developing opt-in "Smart Home Rates"
  - Looking at different forms of Distributed Energy Resource compensation beyond Net Metering

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

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

Line Extension Policies

- Policy that dictates how much investment cooperatives make when connecting new members (based on length or cost)
- Purpose is to make new customers look “average” from a rate perspective
- Reduces likelihood of “growing” into a rate increase
- Helps ensures equitable treatment of all members on the system

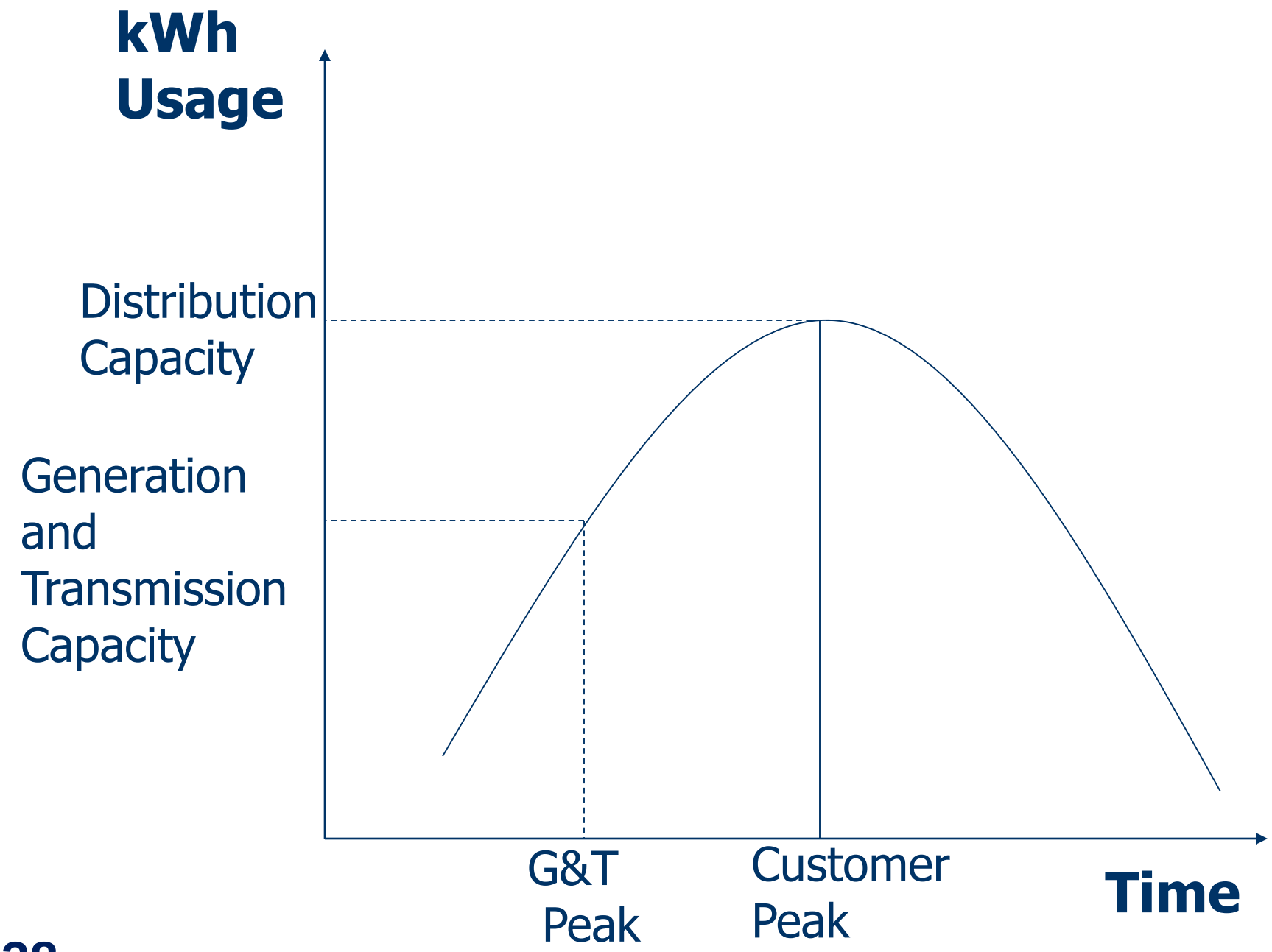
And you reckon it's cheaper to leave it running all the time?

Time of Use ("TOU") Rates

- Been around for some time but we're seeing more and more cooperatives implement Optional TOU rates
- Gives members an opportunity to manage their energy bill in a time of rising prices
- Sends a much better price signal than flat rates
- Also provides utilities with an opportunity to reduce costs by providing incentives for customers to shift usage to time periods that are less costly to serve

Basis for TOU 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)


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

Key Metrics to Consider when Developing TOU Rates

- Choose the on-peak period as narrowly as possible
  - Broad peak periods 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
- Need at least a 3X multiplier for on-peak rate
- Differential between flat energy charge and off peak charge can influence some member participation

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

Community Solar

- Seeing much more interest in Community Solar programs from all utility business models
- Allows utility to own and/or control solar facility while allowing customers without the environmental or financial resources to purchase renewable energy
  - Also allows customers who may want to buy some amount of green power to do so without spending $$ to install their own system
- Good for PR in the local communities

Community Solar

- Most common sales approach is to sell shares of solar array at a certain price per Watt
- Member would then receive free energy off the project based on the # of shares purchased which offsets the purchased power on their bill
  - Distribution component is not included
- Other cooperatives enter into a PPA
  - Members pay for the panels and the coop is obligated to purchase all energy at a fixed price per kWh
  - Not as common, but feasible

Pricing of Community Solar

	Levelized Pricing	Non-Levelized Pricing
Energy Charge (¢/kWh)	Alternative 1A Levelized ¢/kWh Charge	Alternative 2A Non-Levelized ¢/kWh Charge
Fixed Monthly Charge ($/Quarter-kW)	Alternative 1B Levelized $/Quarter-kW	Alternative 2B Non-Levelized $/Quarter-kW

- MG&E use levelized energy charges (1A)
- Xcel and Southern Company uses levelized fixed charges (1B)
- KU and LG&E proposed non-levelized fixed charges (2B)
- Give credits from variable to full embedded cost of generation

Pricing of Community Solar – Levelized Approach

- Pros
  - Lower cost in the early years of the project
  - Many times associated with long-term contracts which gives price certainty for customers
  - Gives utility price certainty on charges billed to subscribers thus there is no need to update during rate changes
- Cons
  - Standard customers will subsidize the program in the early years even if fully subscribed and will subsequently be subsidized by community subscribers in the later years
  - Typically understates cost of community solar due to cost of failure or replacement components not being factored in

Pricing of Community Solar – Non Levelized Approach

- Pros
  - Will not create subsidies between subscribers and non-subscribers
  - Doesn't require customer to take service for 25 years
  - Can be adjusted for change in depreciation and O&M costs
  - Allows for additional projects to be incorporated without changing subscription price
- Cons
  - Higher cost in early years of the project
  - Charges would need to be updated every time rates are changed or cost of service study is performed

Conclusion - Where Are We Heading?

- Cost-based rates are the premier rate design that utilities should endeavor to implement
  - Demand charges more accurately reflect cost(s) utilities incur to serve customers
- Time of Use pricing is a step in the right direction
  - Breaks the common misconception that the cost of providing power is the same during all time periods
- Pricing Distributed Generation needs to be fair and equitable (Net Metering not sustainable)
- Customer communication & education is crucial

Questions?

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