Ratemaking Trends: Stranded Investments and Distributed Generation

September 12, 2017

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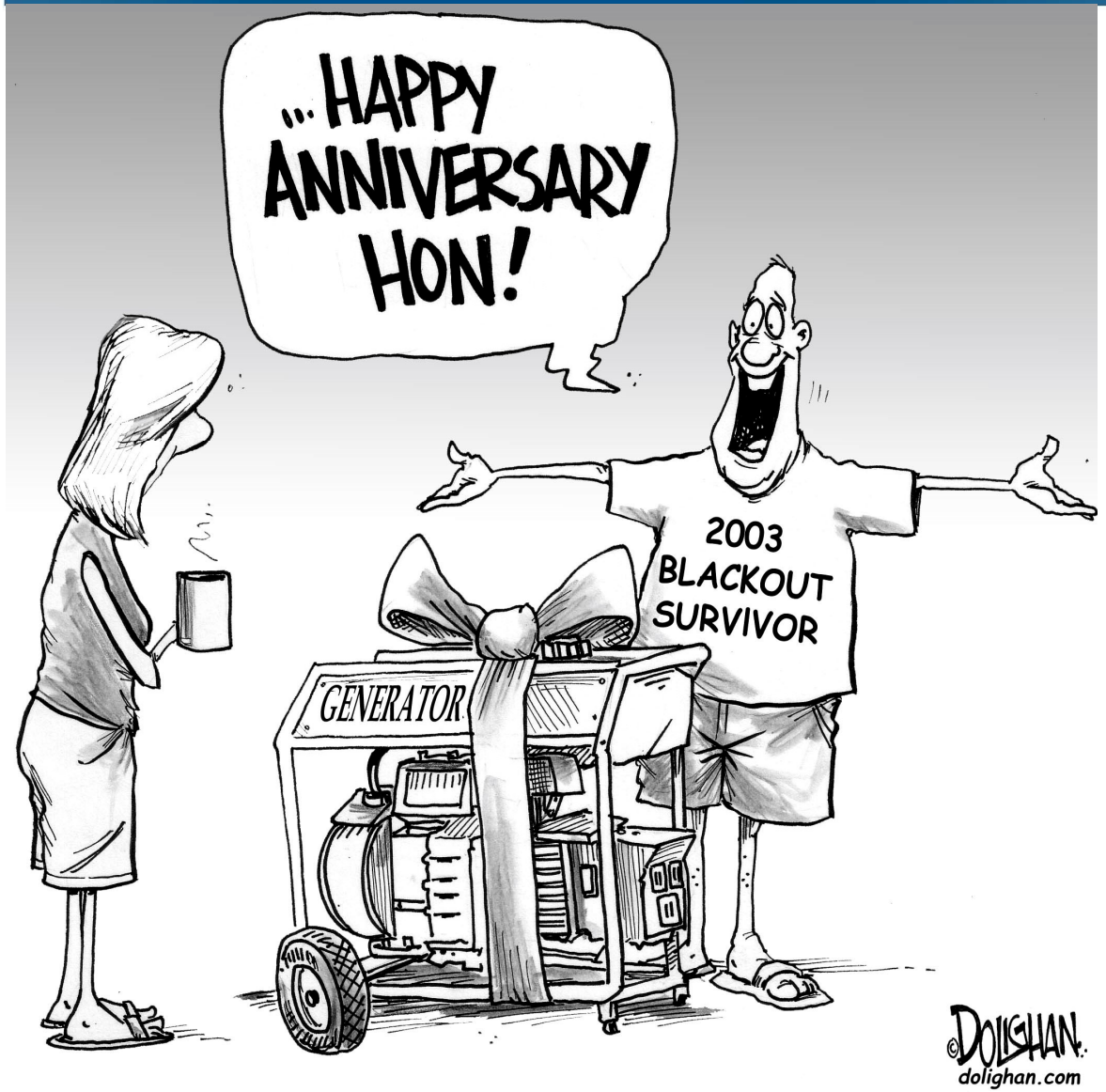
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Rate Design Trends for Distributed Generation and Stranded Investments

- 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 members
- 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

Rate Design Trends for Distributed Generation and Stranded Investments

- Increased interest in Standby, All-in Distribution / Straight Fixed Variable Rates, and Decoupling mechanisms
- Review and update of cooperative Line Extension Policies

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 member 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

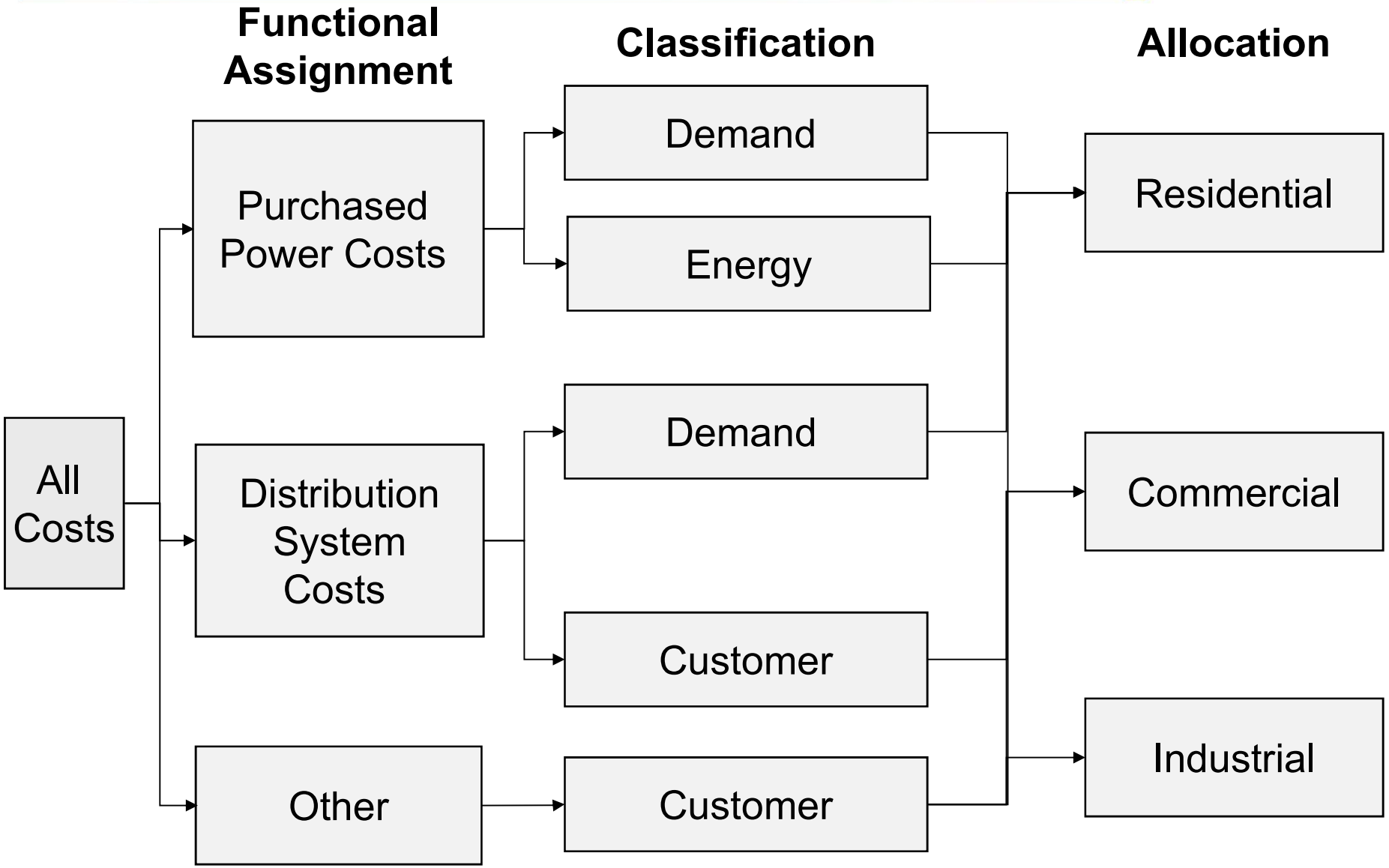
Equitable Cost Recover

- Based on the principle that if a member causes a cost to be incurred by the cooperative, the member should pay the cost
- Begs the question “What member 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 members
  - 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 members served

Cost of Service Study



Recovering Fixed Costs

- Fixed costs can be recovered through rates paid by members over time
  - Depreciable life, and thus the full cost of 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
  - Line Extension Policy

Distribution Fixed Cost Recovery

- The goal is to recover fixed distribution costs as fairly as possible from both larger and smaller usage members and high and low load factor members
  - Non-volumetric fixed distribution costs are recovered through a fixed charge that does not vary with usage (fixed monthly charge)
  - Volumetric fixed distribution costs are 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 members
- Members 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 members 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 members 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
  - Members buying large amount of kWhs are paying more than their fair share of fixed costs and margins
  - Members buying small amount of kWhs are paying less than their fair share of the fixed costs necessary to provide and maintain a minimum system
    - Includes members who install DG, every kWh they self-generate “strands” 1.916 cents of customer-related fixed cost

Stranded Cost Example – Access Charge – What is the Member getting?

- Access Charge recovers fixed costs incurred by the cooperative that allows basic access to electricity
  - Meter, Service drop, and other equipment required for basic grid access ("Minimum system" or "0 kVA")
  - Meter reading and billing costs
  - Customer service costs
  - Portion of Administrative & General expenses
- Every member must have these items to take service from cooperative therefore recovery of these costs are most appropriate through a fixed charge per month from each member since they do not vary with consumption

Stranded Cost Example Continued

- Demand-related costs of 2-3 cents per kWh are also not recovered
- With a standard two-part rate (Access/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 or a revenue mechanism that “decouples” revenue from sales.

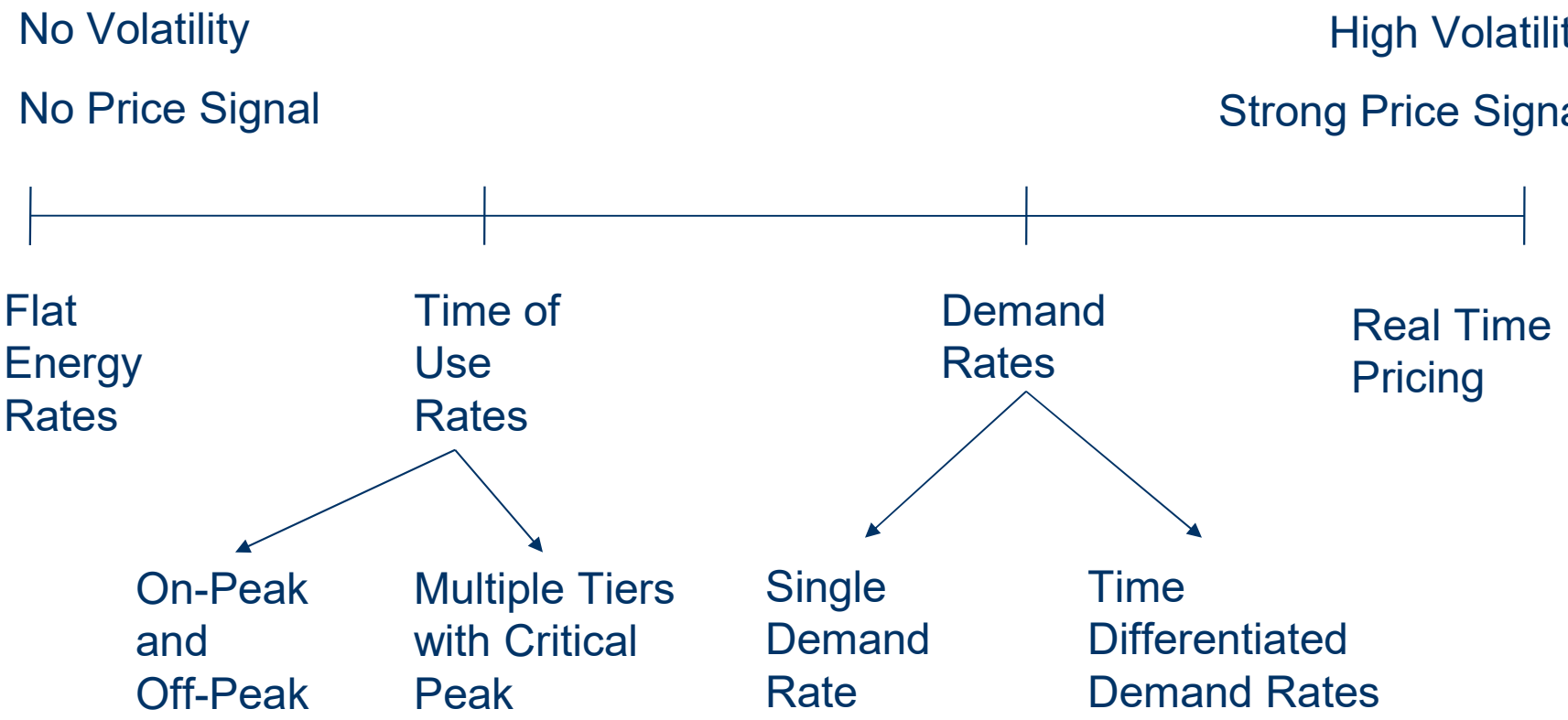
Cost Based Rates

- 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 members

- 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 members
  - 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 / Facilities 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 cooperative 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 members (irrigation, grain-drying, ski areas, etc.)
- Difficult to understand for Residential/Small Commercial members without communication)

Four Part Rate

- Customer / Access / Facilities 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 the customer's maximum demand requirements

Pros/Cons Four Part Rate

Pros

- Most appropriately reflects how costs are incurred by the cooperative and is non-discriminatory to all members
- 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 members if they cannot shift load away from peak
- Can be difficult to understand for Residential/Small Commercial members without communication

Sample Four Part Rate

Coincident Peak Demand rate: **$7.68 / kW**

Non-Coincident Peak Demand rate: **$3.51 / kW**

Energy rate: **4.666¢ / kWh**

Customer charge = **$12.25**

Peak Period:	April – October:	1pm – 5pm
	November – March:	7am – 11am

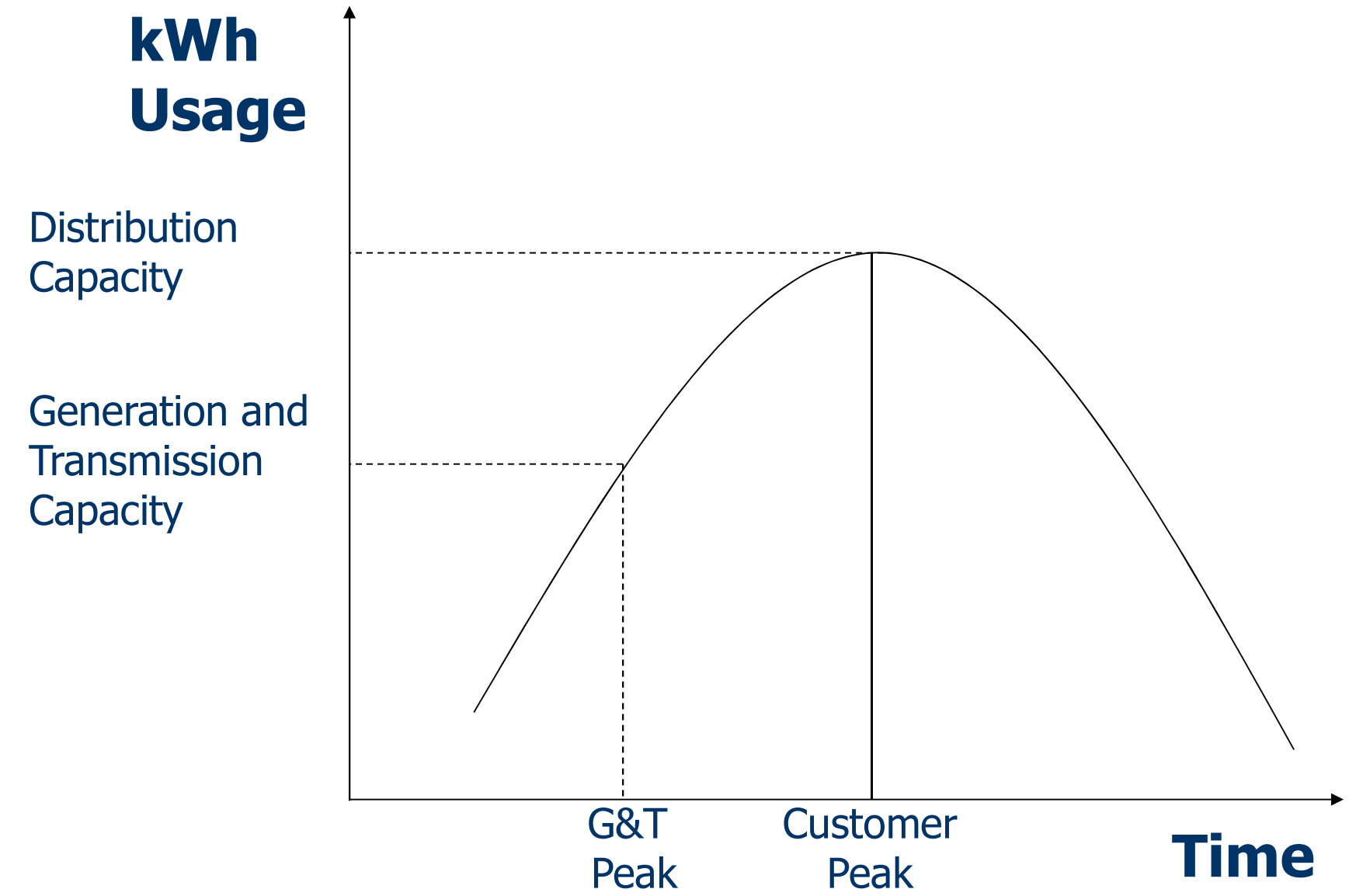
And you reckon it's cheaper to leave it running all the time?

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
  - Provides members (including DG) with choice
- Sends a much better price signal than two part rates
- Also provides utilities with an opportunity to reduce costs by providing incentives for members to sift usage to time periods that are less costly to serve

Basis for Time Differentiated Rates

- The cost of serving load differs substantially over time
- Fixed cost power 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 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 members
    - Results in small differential between on-peak and off-peak because the denominator in the calculation of the on-peak adder is larger
- 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: **22.9666¢ / kWh**

Off-peak rate: **6.365¢ / kWh**

Customer charge = **$12.25**

Peak Period:	April – October:	1pm – 5pm
	November – March:	7am – 11am

Communication With Members is Critical

- In a flat rate environment, there is no financial benefit for members to move usage to other time periods
- Need to convince members 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 members
  - Avoid technical data when possible
  - Communicate the dollar savings

Convincing Members they can save money on Time of Use Rates

- Help to identify equipment that will help members take advantage of TOU rates
- Educate members how to use equipment to take advantage of rates
- For example:
  - With an on-peak rate of 22.9¢/kWh and an off-peak rate of 6.365¢/kWh, a customer can save:
    - 50¢ by shifting one hour of clothes drying (3.0kW) from on-peak to off-peak (22.9¢ - 6.365¢) x 3.0 kWh
    - 30¢ by shifting one hour of dish washing (1.8kW) from on peak to off-peak

Standby Rates

- Popular topic amongst cooperatives this year
  - Interest in these rates for all members but primarily those with behind-the-meter generation
  - 100% load factor rate for distribution meaning that Cooperative must plan to serve all 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 members 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, some cooperatives have language regarding the minimum charges associated with the standby rate being the higher of:

  (1) the Member'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 members when they rely on the backbone system

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 members look “average” from a rate perspective
  - Rates should include some “standard” level of service for facilities that are built into base charges
- A good line extension policy helps to promote rate stability of the distribution portion of the rate while balancing equity and growth considerations
- Reduces likelihood of “growing” into a rate increase

Decoupling Mechanisms

- Revenue mechanism that decouples revenue from sales of electricity
  - Based on a historical revenue requirement determined to be necessary to maintain appropriate financial standing
  - Over/Under recovery typically collected based on comparison of net revenue requirement per customer to actual net revenue per customer in the prior year multiplied by total actual number of customers during that same period
- Popular in jurisdictions where approval of higher customer charges is difficult
- Reduces likelihood of stranded investments but can perpetuate subsidies between rate classes

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 members & typically implemented alongside a Power Cost Adjustment mechanism

Conclusion

- Distributed Generation rates need to be fair and equitable to avoid stranded or shifted costs
  - Net metering unsustainable
- Cost-based rates are the rate design that cooperatives are endeavoring to implement to minimize stranded investments
  - Three/Four part rates more accurately reflect cost(s) utilities incur to serve members
- 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
- More elaborate rate mechanisms are an option but can perpetuate or shift subsidies between rate classes

Questions?

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