



Power System
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Electric Cooperative Fixed Cost Recovery

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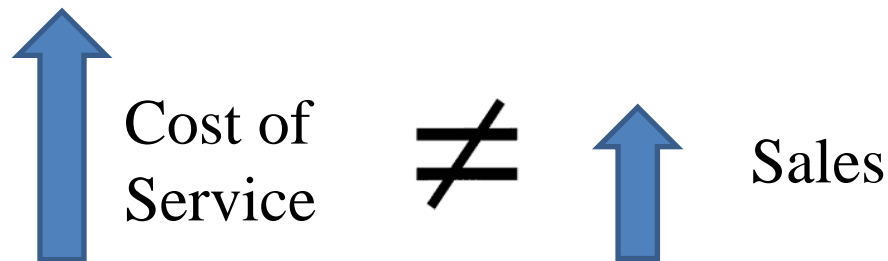
October 29, 2014

Agenda

- Introduction and Background
- Cost vs. Rate Structure
- Rate Making
 - Customer Charge
 - Straight Fixed Variable Rate
 - Demand Charge
 - Capacity Based Customer Charge
 - Grid Charge
- Conclusion

Introduction

- Electric cooperatives face a challenge in aligning rate structures with cost structures.
 - If structures are not aligned, then cost recovery and margins are at risk.
- The cost to provide electric services is increasing faster than sales.



Introduction

- Absent rate increases, rate misalignment coupled with increasing costs could very well result in:
 - Reduced annual margins
 - Reduced equity
 - Deferred capital projects
 - Decreased reliability
 - Inability to maintain capital credit retirements

Cost Structure

- Electric rates for the majority of retail customers in the U.S. are based on the cost of providing service, including:
 - Operating expenses and,
 - Return or margin
- Majority of a distribution cooperative's costs are fixed – incurred independent of how much energy is sold.
 - Include depreciation, long-term interest, O&M costs
- Typically the only variable costs are the wholesale energy costs.
 - Which constitute only 1/4 to 1/3 of the total cost of service

Rate Structure

- The majority of distribution cooperative's revenue stream comes in the form of variable charges versus fixed charges.

Variable Charge:

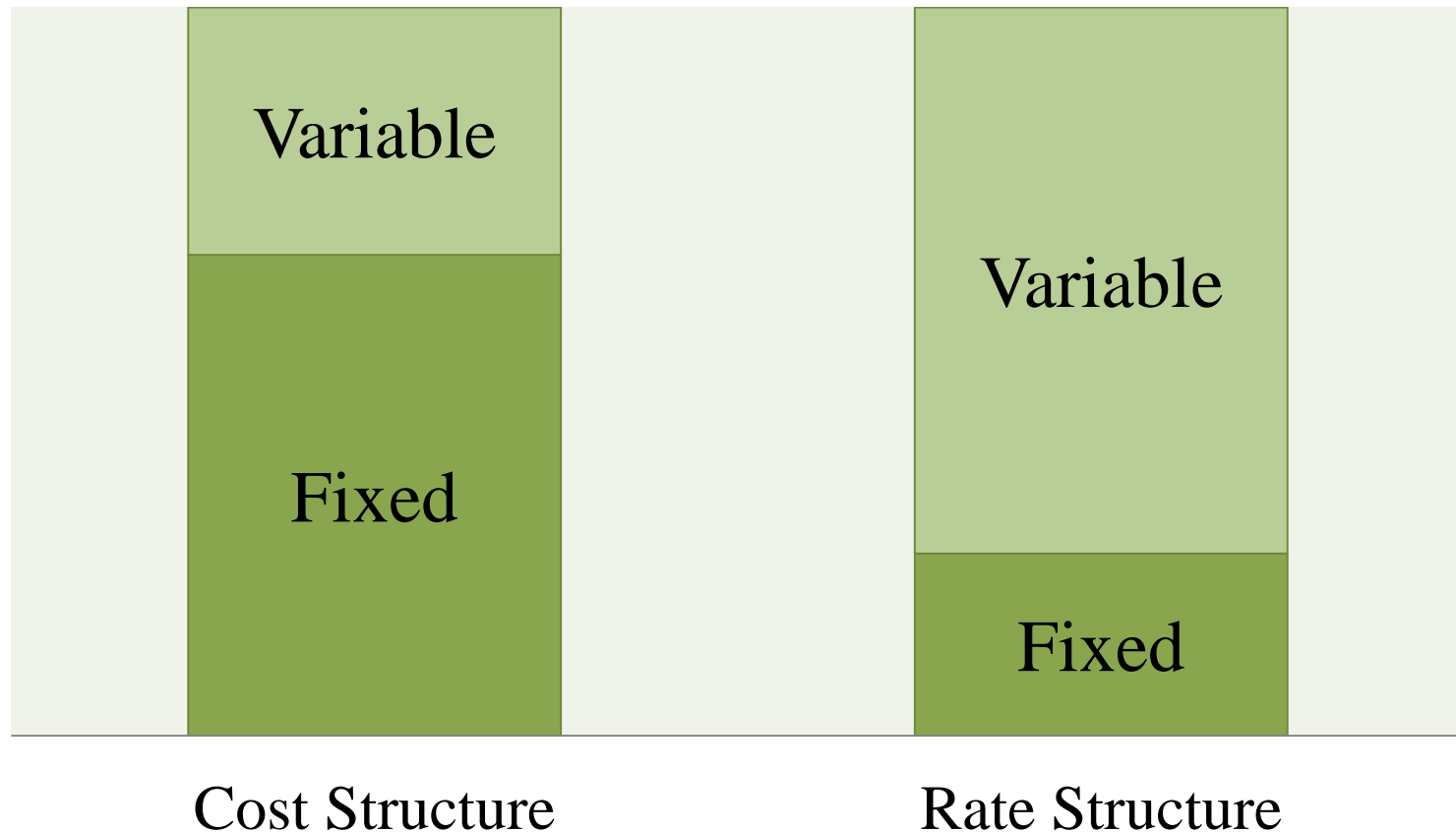
- Energy rate

Fixed Charge:

- Customer charges

Misalignment of Cost and Rate Structures

- The imbalance between how costs are incurred and recovered creates risk.



Aligning Rate Structures to Cost Structures

The solution looks simple:

- Set the rate so that fixed costs are collected in fixed charges and variable cost are collected in variable charges

However...

- It's not as easy as it looks!

There are difficult legacy issues and competing rate design objectives that need to be included in the discussion.

Ratemaking

- Ratemaking has long been described as an “art” rather than a “science.”
 - Requires a delicate balance between various and often competing objectives:
 - Fairness
 - Acceptability
 - Gradualism
 - Price signals
 - Consistency
 - Adequacy

Customer Charge

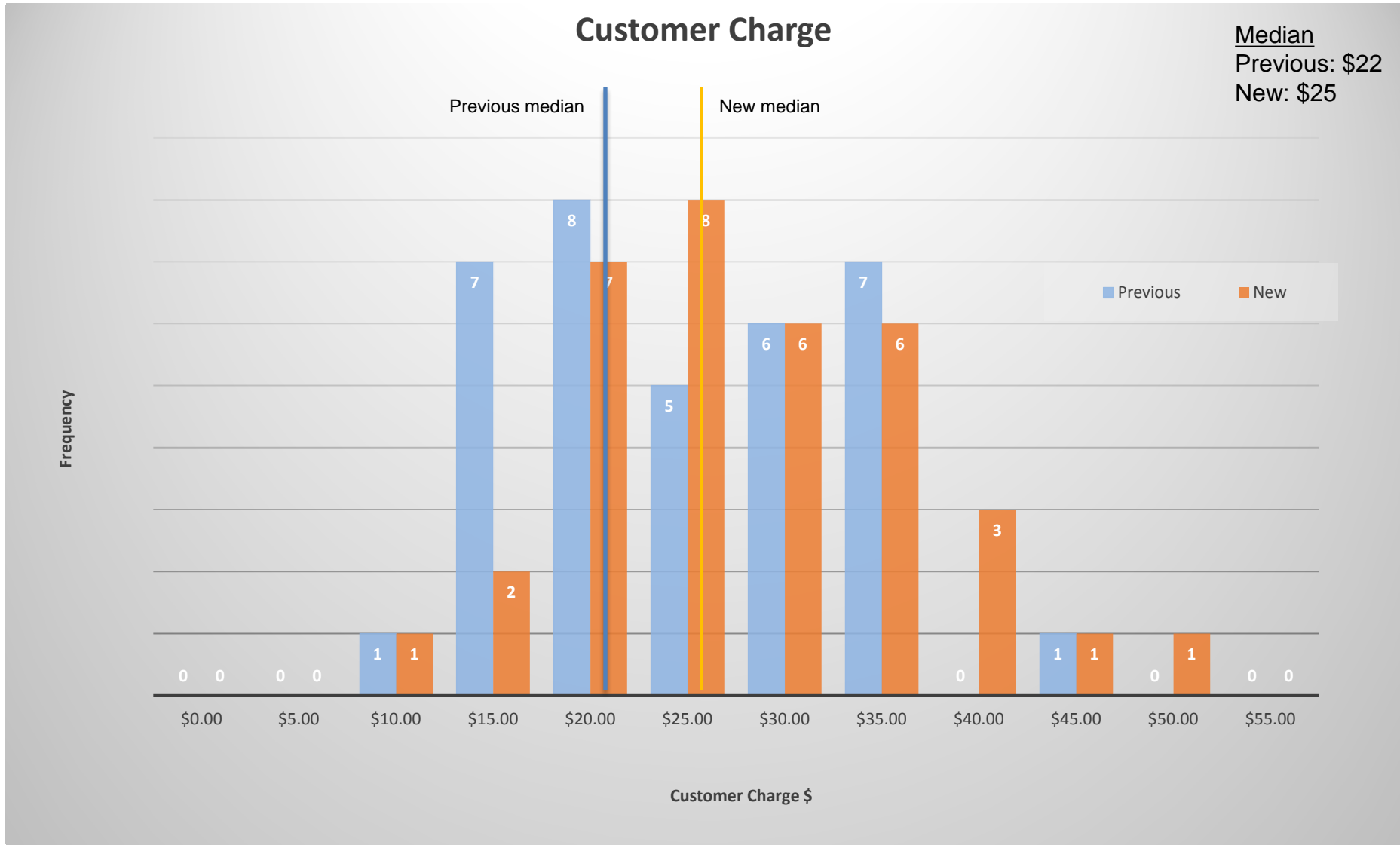
- Electric Cooperatives have been increasing the Customer Charge to recover more fixed costs.
- In a recent survey conducted by PSE:
 - 34 out of 35 rate design studies resulted in the Board of Directors approving an increase in the Residential customer charge.

PSE Customer Charge Survey 2012 - 2013

PSE Residential Customer Charge Survey 2012 - 2013							
Cooperative	Customer Charge		Change		COS Study	Percent of	Customers
	Previous	New	Dollars	Percent	Reference	COS Study	Per Mile
Cooperative 1	\$ 9.00	\$ 10.00	\$ 1.00	11%	\$ 43.42	23%	5.7
Cooperative 2	\$ 10.50	\$ 13.50	\$ 3.00	29%	\$ 33.76	40%	12.3
Cooperative 3	\$ 12.00	\$ 14.00	\$ 2.00	17%	\$ 36.78	38%	7.0
Cooperative 4	\$ 14.69	\$ 16.00	\$ 1.31	9%	\$ 48.09	33%	6.8
Cooperative 5	\$ 17.00	\$ 19.00	\$ 2.00	12%	\$ 30.33	63%	6.3
Cooperative 6	\$ 15.00	\$ 19.00	\$ 4.00	27%	\$ 32.77	58%	17.5
Cooperative 7	\$ 17.00	\$ 19.00	\$ 2.00	12%	\$ 63.57	30%	2.8
Cooperative 8	\$ 11.25	\$ 19.50	\$ 8.25	73%	\$ 30.33	64%	15.9
Cooperative 9	\$ 15.00	\$ 20.00	\$ 5.00	33%	\$ 29.85	67%	1.7
Cooperative 10	\$ 18.25	\$ 20.00	\$ 1.75	10%	\$ 48.99	41%	1.6
Cooperative 11	\$ 18.00	\$ 21.00	\$ 3.00	17%	\$ 37.10	57%	4.7
Cooperative 12	\$ 16.00	\$ 21.00	\$ 5.00	31%	\$ 52.62	40%	2.2
Cooperative 13	\$ 20.00	\$ 24.00	\$ 4.00	20%	\$ 45.11	53%	4.5
Cooperative 14	\$ 16.00	\$ 25.00	\$ 9.00	56%	\$ 29.68	84%	6.2
Cooperative 15	\$ 22.00	\$ 25.00	\$ 3.00	14%	\$ 43.27	58%	2.1
Cooperative 16	\$ 22.00	\$ 25.00	\$ 3.00	14%	\$ 44.58	56%	2.6
Cooperative 17	\$ 15.00	\$ 25.00	\$ 10.00	67%	\$ 57.10	44%	4.9
Cooperative 18	\$ 19.50	\$ 25.00	\$ 5.50	28%	\$ 66.55	38%	1.7
Cooperative 19	\$ 27.50	\$ 27.50	\$ -	0%	\$ 44.73	61%	3.5
Cooperative 20	\$ 25.25	\$ 28.29	\$ 3.04	12%	\$ 39.64	71%	5.9
Cooperative 21	\$ 25.00	\$ 29.00	\$ 4.00	16%	\$ 64.54	45%	1.9
Cooperative 22	\$ 28.00	\$ 30.00	\$ 2.00	7%	\$ 36.66	82%	5.2
Cooperative 23	\$ 28.00	\$ 30.00	\$ 2.00	7%	\$ 44.11	68%	5.2
Cooperative 24	\$ 25.00	\$ 30.00	\$ 5.00	20%	\$ 47.31	63%	11.5
Cooperative 25	\$ 28.00	\$ 34.00	\$ 6.00	21%	\$ 46.11	74%	5.4
Cooperative 26	\$ 32.00	\$ 34.00	\$ 2.00	6%	\$ 55.84	61%	4.9
Cooperative 27	\$ 30.30	\$ 35.00	\$ 4.70	16%	\$ 42.66	82%	7.9
Cooperative 28	\$ 32.50	\$ 35.00	\$ 2.50	8%	\$ 44.65	78%	4.7
Cooperative 29	\$ 24.00	\$ 35.00	\$ 11.00	46%	\$ 53.08	66%	3.0
Cooperative 30	\$ 30.00	\$ 35.00	\$ 5.00	17%	\$ 62.79	56%	3.7
Cooperative 31	\$ 34.00	\$ 36.00	\$ 2.00	6%	\$ 56.43	64%	5.6
Cooperative 32	\$ 32.00	\$ 37.00	\$ 5.00	16%	\$ 54.19	68%	2.2
Cooperative 33	\$ 35.00	\$ 40.00	\$ 5.00	14%	\$ 64.41	62%	3.7
Cooperative 34	\$ 34.10	\$ 43.00	\$ 8.90	26%	\$ 64.15	67%	0.7
Cooperative 35	\$ 43.00	\$ 48.00	\$ 5.00	12%	\$ 72.69	66%	0.7
Average - All	\$ 22.91	\$ 27.08	\$ 4.17	18%	\$ 47.65	57%	5.2

- Average Increase: \$4.00
- Maximum Change: \$11.00
- Average Recovery: ~60%

PSE Customer Charge Survey 2012 - 2013



Customer Charge

- Increasing the Customer Charge is a strategic business decision.
 - The increase may never be “easy,” and it may never be the “right time.”

Implementation Strategies

1. Gradual or planned phase-in
 - Setting a goal and developing a plan to get there.
 - Three year plan, Five year plan, Increase every other year.

2. One-time adjustment

Gradual or Phased-In Customer Charge Adjustment

- Example:
 - Sioux Valley Energy (SVE)
 - 22,000 customers in southeast South Dakota and southwest Minnesota
 - Averages 3.7 customers per mile of line
 - 57% of sales to residential and farm members
 - Historically focused rate design on...
 - Stability
 - Gradualism

SVE Example (Continued)

- In 2010, completed new COS study for Five-Year Planning Horizon
 - Objectives
 - Bring individual rate margin levels closer to parity
 - Identify and gradually achieve desired rate structure changes
- Key objective: achieve a Customer Charge equal to 70% of Customer Cost
 - Coupled with a goal to eliminate declining block energy charge rate structure

SVE Example (Continued)

- Projected 2014 COS study
 - \$5 per month increase to the Customer Charge in each of the next 5 years
 - Required both external and internal education efforts
 - Reassessed initial goals and plans each year
 - Remained committed that strategy was in the best interest of the cooperative and membership
- Result
 - Progress towards stable and equitable rate structures

One-Time Customer Charge Adjustment

- Sometimes a direct one-time adjustment is preferred
 - Need:
 - Effective Communication
 - Engagement
 - Education

Lake Country Power Example

- Example:
 - Lake Country Power
 - 43,000 members in northeastern Minnesota
 - Service territory over 10,000 square miles with 8,100 miles of line
 - Substantial portion of seasonal consumers
 - Customer Charge Goals
 - Recover the total COS in a fair and equitable manner to both part-time and year-round members

Lake Country Power Example (Continued)

Rate Restructuring Strategy (Three Options)

1. Increase the Customer Charge to the full COS determined amount, while summer and winter Energy Charges decrease more than 20%
 2. Middle ground design to increase the Customer Charge to 50% of the full COS result
 3. Preserve the then current Customer Charge
- Took it to the membership for a vote
 - 15% of the members voted - choosing Option 1
 - Followed by many questions, letters, complaints, etc.; but no major fireworks

Distributed Generation

- Exacerbates fixed-cost recovery challenges
 - Net metering allows DG owner to reduce/eliminate their purchase of energy
 - Possibly receiving compensation for any net excess
- DG owners still require access to the grid
- Solar DG customers may be expanding its use of the grid by relying on it for the export of excess generation, i.e. from a one-way to a two-way grid
 - Shift costs to non-solar DG members

Cost Shifting Moderation

- If an electric cooperative recovers more fixed costs in the Customer Charge, solar PV cost shifting can be moderated

Comparison of Distribution Revenue

- Net metering scenarios
 1. Low Customer Charge and high Energy Charge
 2. High Customer Charge and low Energy Charge

Net Metering Impact on Distribution Revenue Distribution Cooperative Perspective			
	Gross	Annual 4 kW DG Production	Net Metered
Assumptions			
Annual Energy Consumption (kWh)	1,200	5,142	6,858
Annual Energy Purchases (kWh + 5% loss)	12,600	5,399	7,201
Annual CP Demand Purchased (kW)	21.3	8.9	12.4
Low Customer Charge			
Annual Revenue (\$10/mo., \$0.11/kWh)	\$ 1,440	\$ (566)	\$ 874
Annual Purchased Power (\$15/kW, \$0.04/kWh)	\$ 823	\$ (350)	\$ 474
Distribution Revenue	\$ 617	\$ (216)	\$ 401
High Customer Charge			
Annual Revenue (\$40/mo., \$0.08/kWh)	\$ 1,440	\$ (411)	\$ 1,029
Annual Purchased Power (\$15/kW, \$0.04/kWh)	\$ 823	\$ (350)	\$ 474
Distribution Revenue	\$ 617	\$ (62)	\$ 555

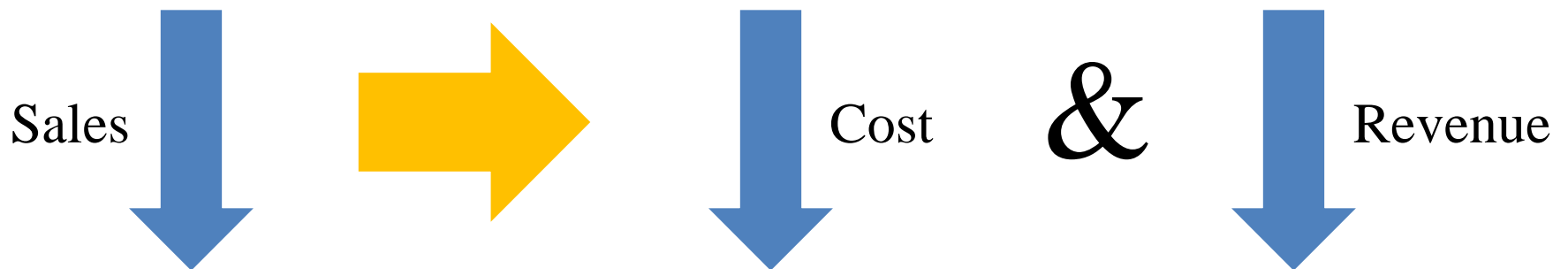
Results:

- Increasing the Customer Charge to recover more fixed costs helps maintain recovery of fixed costs
 - However, even under a High Customer Charge; capacity-related fixed costs go unrecovered
- Rate Design Solutions:
 - Straight Fixed-Variable (SFV) rate design
 - Demand Charges
 - Capacity-Based Customer Charges
 - Grid Charges

Straight Fixed Variable (SFV) Rate

- Recovers all fixed costs in fixed charges
- Recovers all variable costs in variable charges
 - Decreases in sales produce a decrease in both costs and revenue

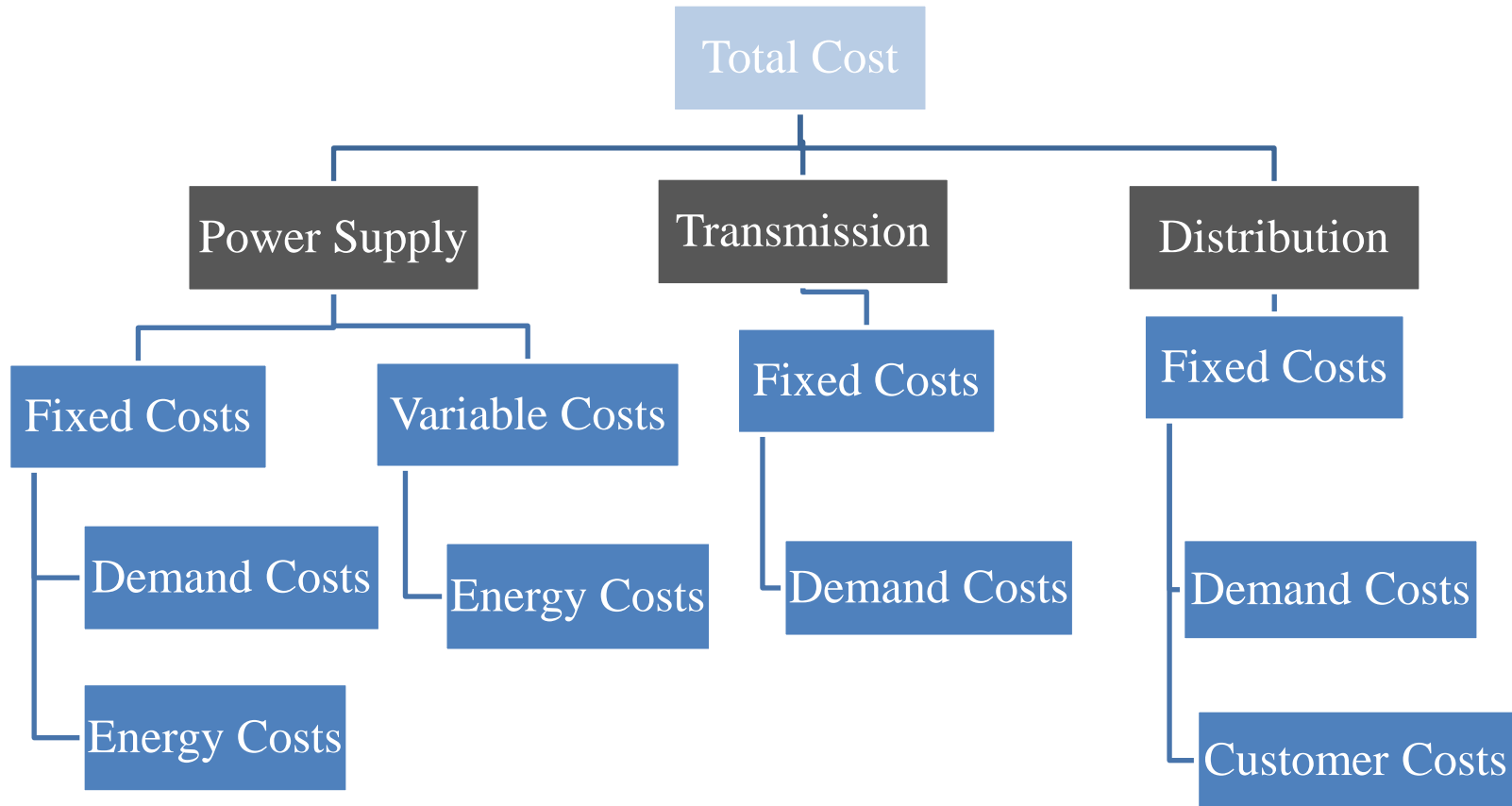
Under a Straight Fixed Variable Rate



SFV Rate

- Concerns
 - Creates financial stability, but does not adequately consider the principle of causation and thereby fairness
 - Placing all fixed costs into one fixed charge for a rate class ignores differing costs that are dependent on customer requirements
 - Overcharges smaller members and undercharges larger members

Customer vs Capacity Fixed Costs



- Proper rate design separates all capacity-related fixed costs into a separate fixed component accounting for size requirements

Demand Charge

- Demand-related fixed costs are best recovered in a size-based charge
- Implementing a Demand Charge is a COS-based rate design that helps stabilize margins while being fair to members

	Standard Rate	Demand Rate 1	Demand Rate 2
Customer Charge	\$25.00 per month	\$25.00 per month	\$25.00 per month
Demand Charge		\$4.00 per kW	\$14.00 per kW
Energy Charge	\$0.1000 per kWh	\$0.0730 per kWh	\$0.0540 per kWh

- Demand Charges can differ by including distribution demand costs (Demand Rate 1) or power supply, transmission and distribution demand costs (Demand Rate 2)

Demand Charge

- Not many electric cooperatives have implemented Residential Demand Charges
 - For those who have
 - Common for a demand charge to be an optional rate, or to apply for certain-size residential members only
- Challenges:
 - Must have billing demand measurements for each member
 - Additional line item
 - Internal and external education and communication

Capacity-Based Customer Charge

- Similar characteristics of a Demand Charge – based on sizing
- Often been phased out over the past 15 to 20 years
- Challenges:
 - Shared transformers
 - Excess installed transformer capacity
- Similar to internet, cable and satellite fixed charge service

Capacity-Based Customer Charge

- Electric fixed costs ideally recovered through charges that:
 1. Collect a base amount from every customer
 2. Scale up based on size or capacity needs

	Standard Rate	Capacity Charge 1	Capacity Charge 2
Customer Charge	\$21.50 per month		
15 kVA		\$20.00 per month	\$66.00 per month
25 kVA		\$23.00 per month	\$90.50 per month
75 kVA and >		\$31.50 per month	\$168.50 per month
Energy Charge	\$0.1250 per kWh	\$0.1250 per kWh	\$0.0700 per kWh

Grid Charge

- Similar in purpose and function to a Standby Charge
- Ensures net-metered member-consumers pay their share of grid costs and eliminates cost shifting
- Recoups the fixed costs, otherwise recovered in the Energy Charge avoided by net metered member-consumers
- Expressed on a per kWh or per kW basis

Grid Charge (kWh Based)

- Key advantage of kWh Grid Charge
 - Direct link between metered energy production and costs that would be shifted
- Requires metering of production separate from consumption
- Example
 - \$0.04/kWh distribution fixed costs
 - DG facility produces 500 kWh
 - Grid charge = \$20.00 (500 kWh x \$0.04/kWh = \$20.00)

Grid Charge (kW Based)

- Must account for the DG facility's capacity factor
 - Losses in power inverters
 - Orientation
 - Etc.
- May require different charge for different technologies, i.e. wind vs solar
- Key Advantage:
 - Can be applied in any metering setup

Concluding Thoughts

- For most, there exists a misalignment of cost and rate structure
- Misalignment puts margins at risk
- Rate structure assessment is necessary
 - Economic conditions
 - Energy efficiency and conservation initiatives
 - Increasing amounts of self supply
- Consider setting retail rates that stabilize the collection of fixed costs in a fair and equitable manner
- Well-thought-out, planned, and executed strategies prevail

ABOUT PSE

PSE is a full-service consulting firm. Our team has extensive experience in all facets of the utility industry, including communications, IT, and smart grid automation planning and design; economics, rates and business planning; electrical engineering planning and design; and procurement, contracts and deployment.

We are 100% employee-owned and independent, which gives our clients confidence that we are motivated to satisfy their needs and represent their best interests.

Mr. Macke leads PSE's Economics, Rates and Business Planning practice. He has a Masters of Business Administration degree from the University of Minnesota's Carlson School of Management at Minneapolis, Minnesota. His areas of expertise include finance, revenue requirement development, cost of service studies, rate design, contracts, financial forecasting, litigation support, mergers and acquisition, expert testimony, and presenting to utility management, boards, commissions, and industry associations. Mr. Macke is a Vice President at PSE and serves on PSE's Board of Directors and Executive Committee. Mr. Macke can be reached directly at **macker@powersystem.org**.

Mr. Virta is a Rate and Financial Analysis in PSE's Economics, Rates and Business Planning practice. He received a Bachelor of Science degree in Economics and International Studies from the University of Wisconsin at Madison, Wisconsin. His areas of expertise include developing utility revenue requirements and class cost of service studies and various other financial and economic analyses to support bill calculations, mergers and acquisitions and load research programs.

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