

Power System Engineering, Inc.

PSE

NISC Gridposium 2011

Rates and Pricing in a Smart Grid Era

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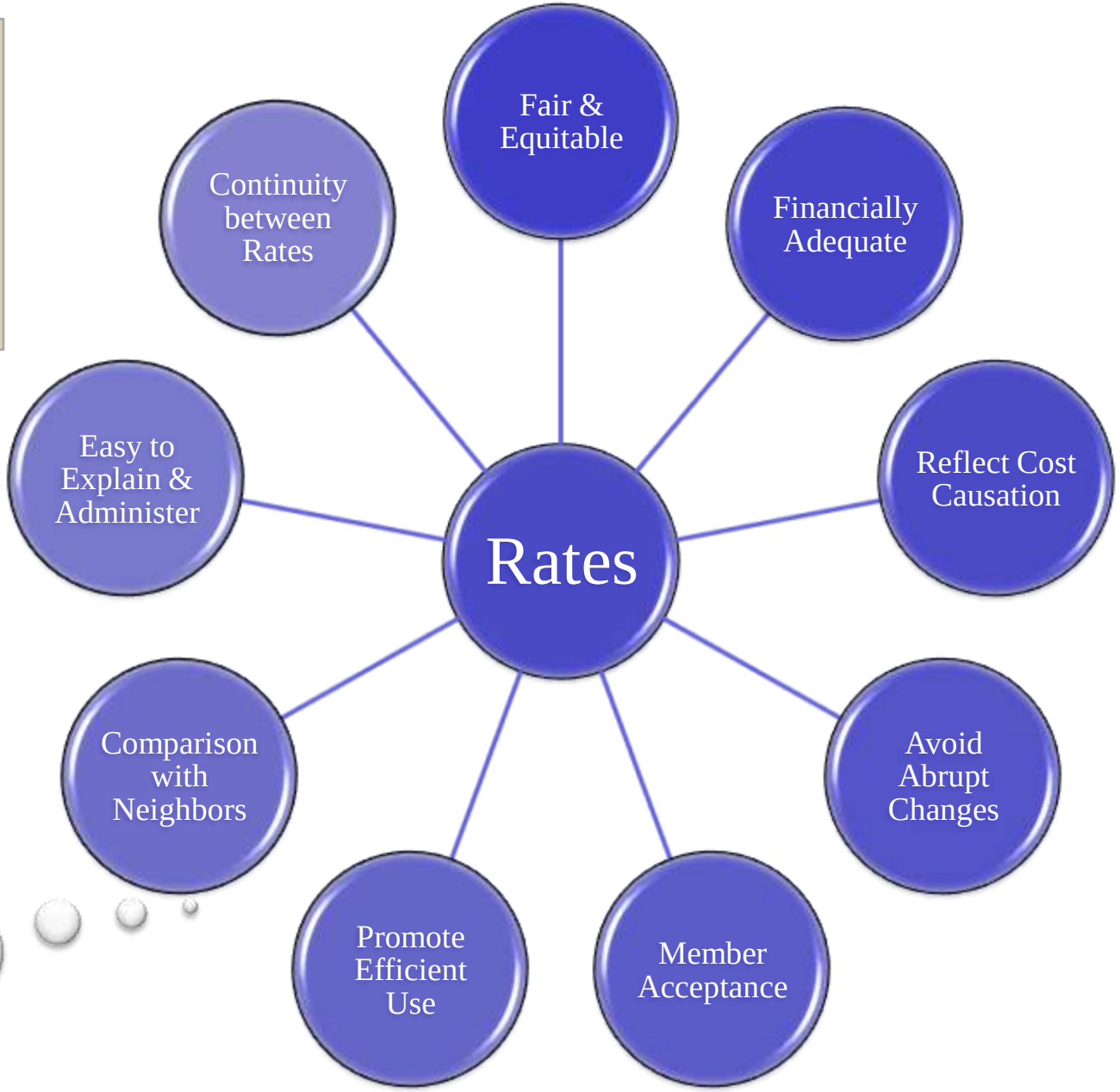
AGENDA

- Ratemaking Principles
- Influences Of The Smart Grid
  - Cost Alignment
  - Rate Design

- How can the smart grid enhance the rate design process.

RATEMAKING PRINCIPLES



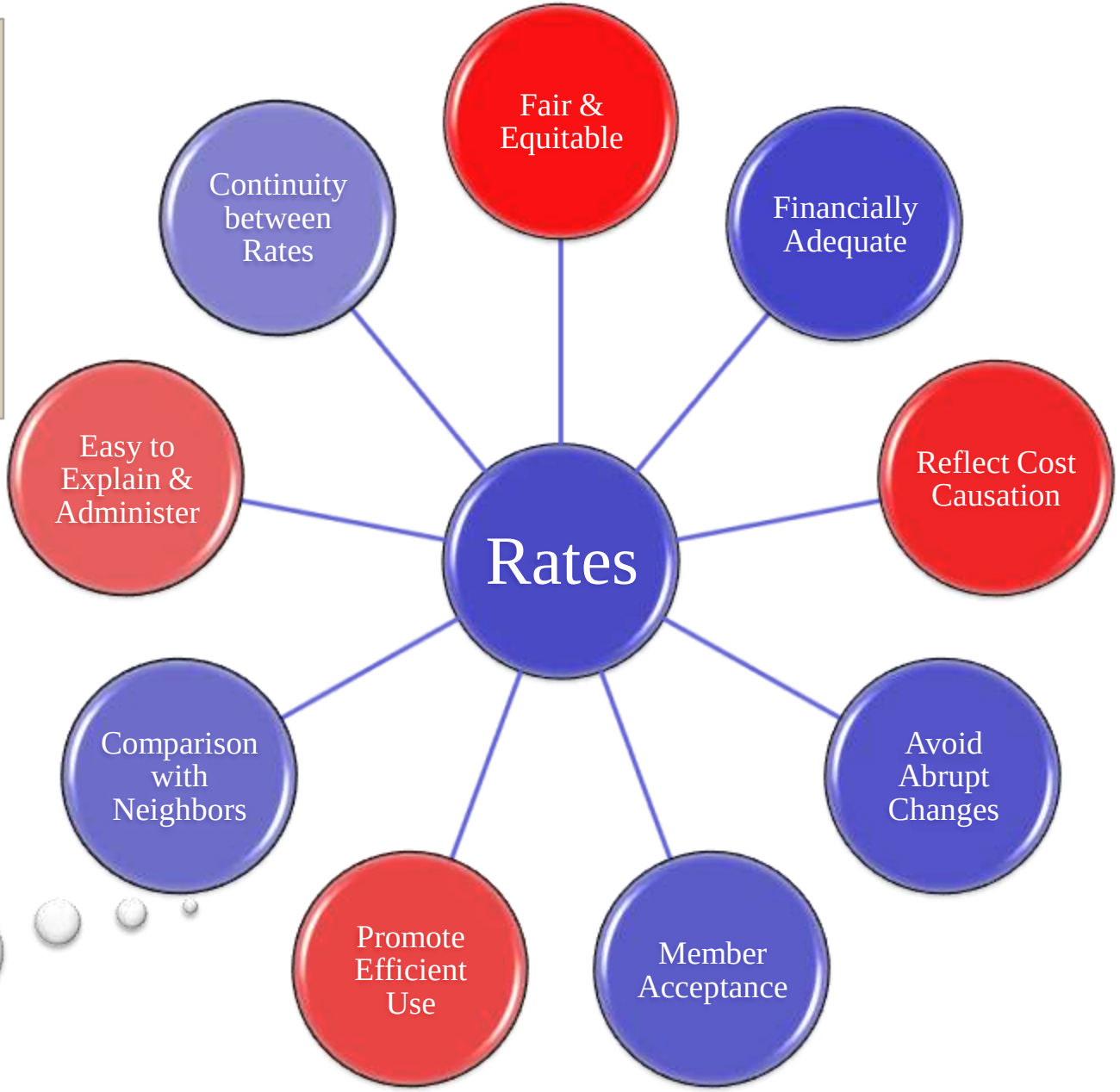
Legislative and Regulatory Influence

RATE DESIGN CAVEAT

- Not all rate design objectives can be simultaneously achieved to their fullest extent.

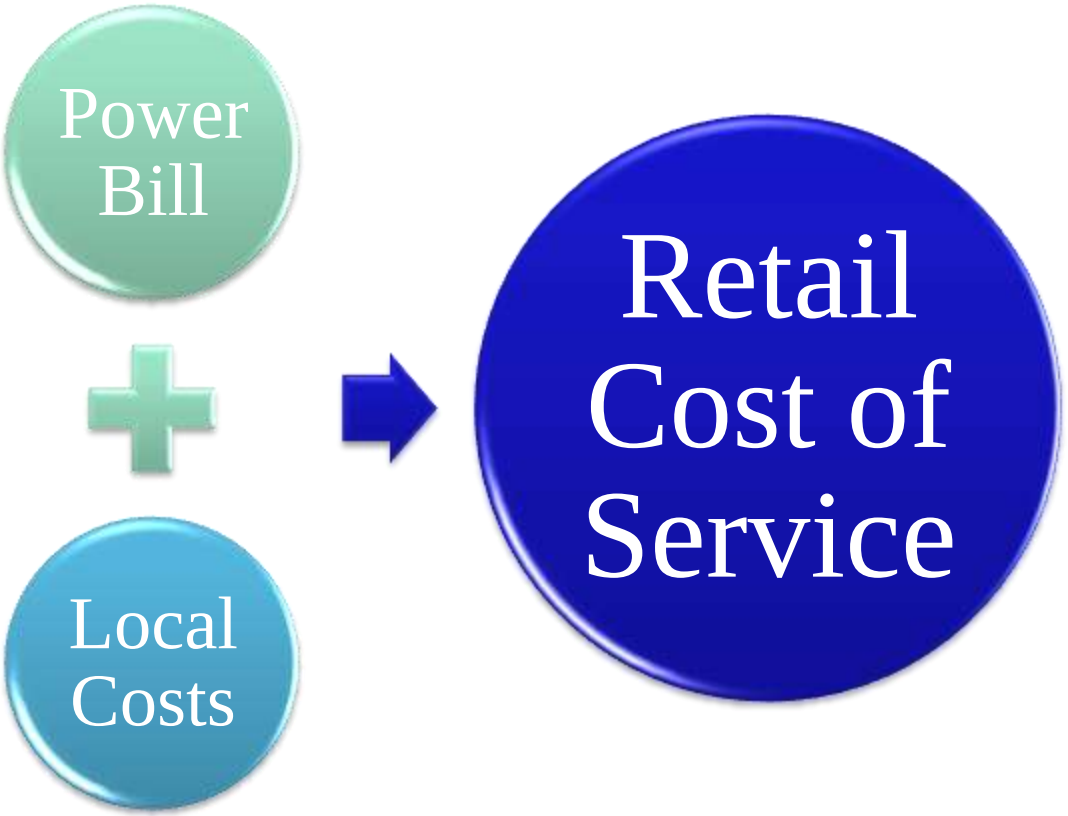
- Must be balanced based on the philosophy and judgment of the cooperative.

Ratemaking Principles Smart Grid Focus

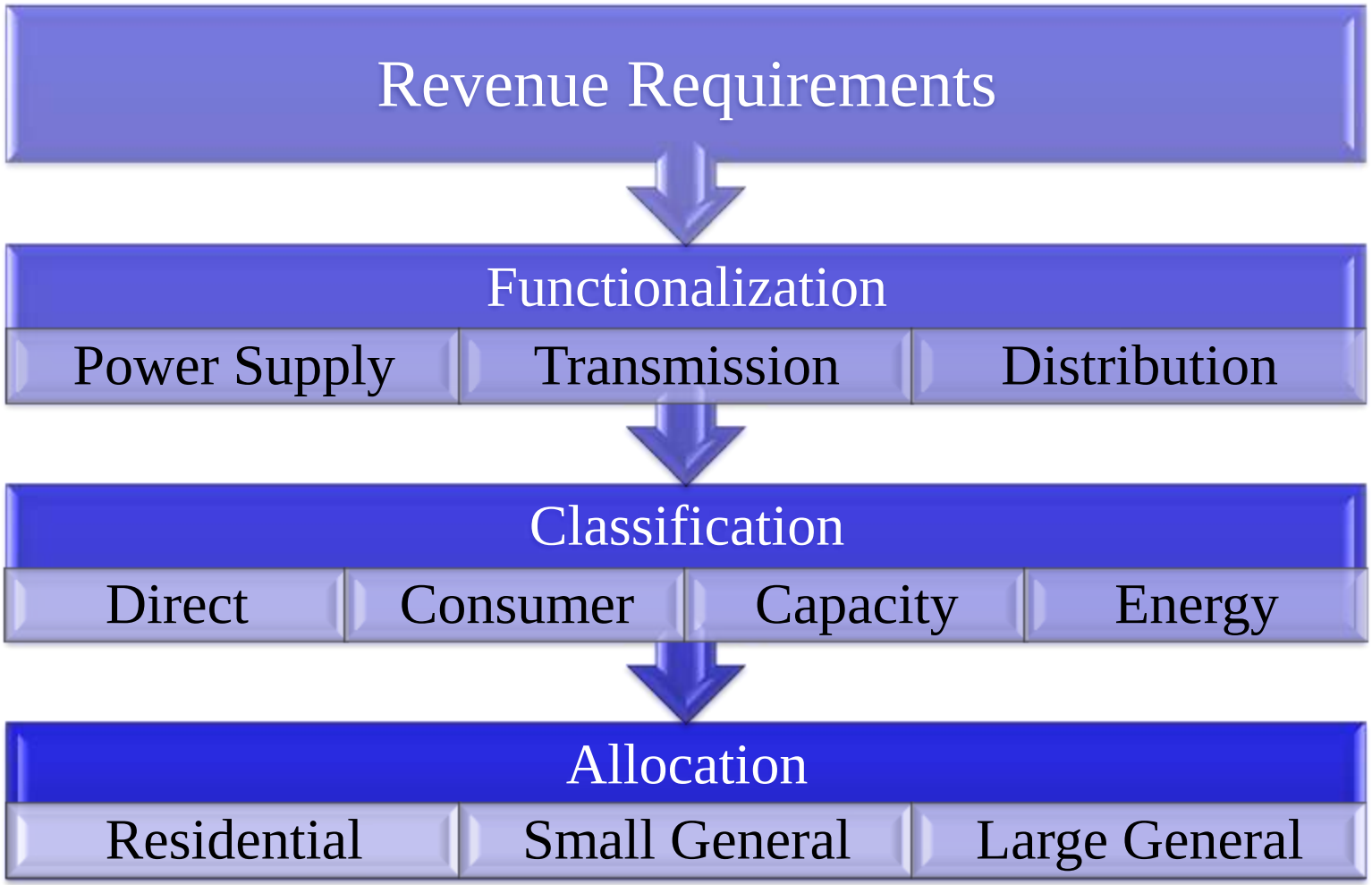


Legislative and Regulatory Influence

Retail Cost of Service Studies



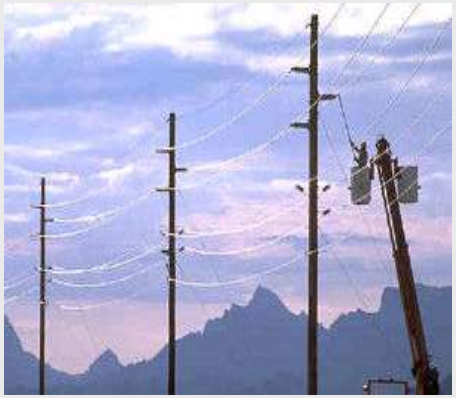
Class Cost of Service Flow



Cost of Service Studies

Electric Utilities are Divided into 3 Activities:

Source: NRECA



	Generation	Transmission	Distribution	Total
Percent of Total Costs	67%	7%	26%	100%
Costs per kWh	5.9¢	0.6¢	2.3¢	8.8¢

- A significant portion of generation and transmission costs are based on peak related costs.
  - Wholesale cost of service methodology.
- Data limitations in assigning responsibility.
- AMI vs. alternative method.

COST OF SERVICE STUDIES

COS Summary Results Default vs. AMI Demand Allocations		
Rate Class	**Default**	**AMI**
Residential	-3.1%	-1.6%
Farm	6.0%	6.8%
Small Commercial	-2.8%	-0.7%
Large General Service (19)	-4.0%	-16.2%
Parks & Recreation Area (36)	8.3%	8.5%
Large Power (03,16,26)	0.1%	-9.1%
Security Lighting (SL)	50.0%	50.1%

- What is each group's share of the revenue requirement?

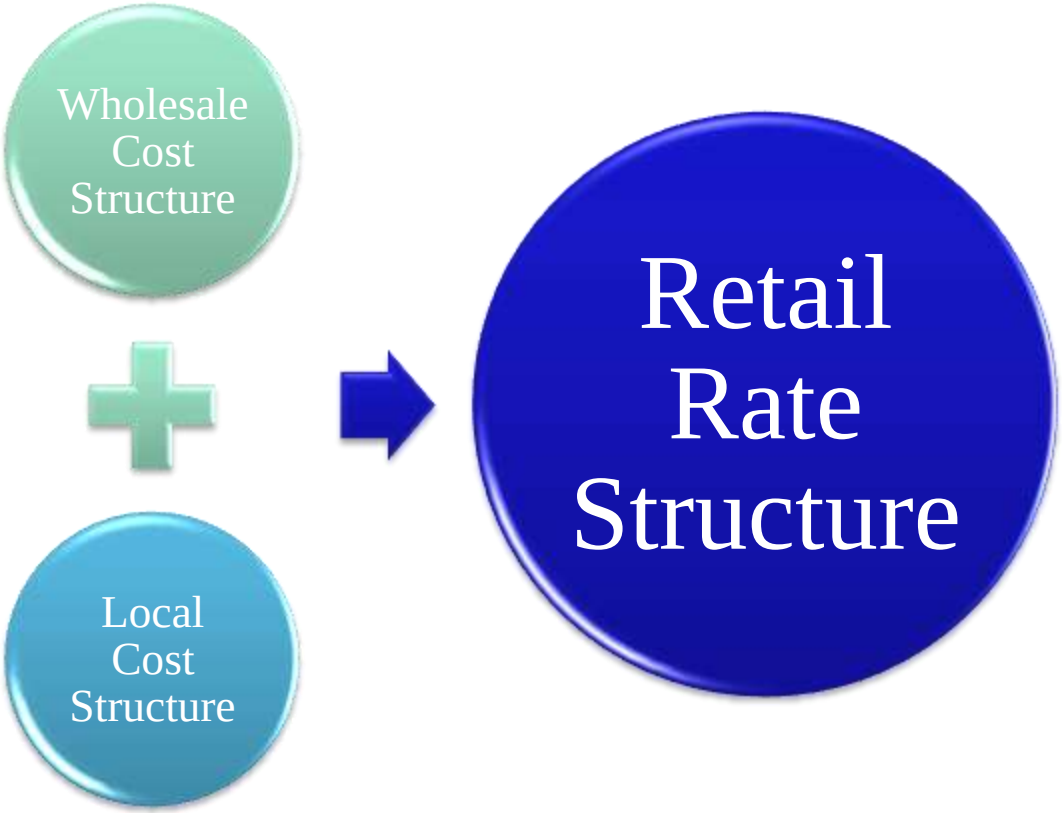
- AMI data is valuable for refining COS methodologies.

  …but you need to keep it.

Impact of Demand Estimate Methods

Rate Class	COS Incr/Decr.	
	Traditional Methods	**Load Research**
Schedule I Residential	8.7%	10.3%
Schedule I Res. Off-Peak Marketing	27.4%	24.9%
Schedule II Small Commercial	-5.8%	-7.8%
Schedule III Schools & Churches	-9.7%	-9.0%
Schedule IV Large Power	4.2%	2.0%
Schedule IV-A 50-2,500kW Large Power	-0.6%	-4.9%
Schedule VI Outdoor Lighting Service	9.9%	10.1%

POWER SUPPLY COST ALIGNMENT



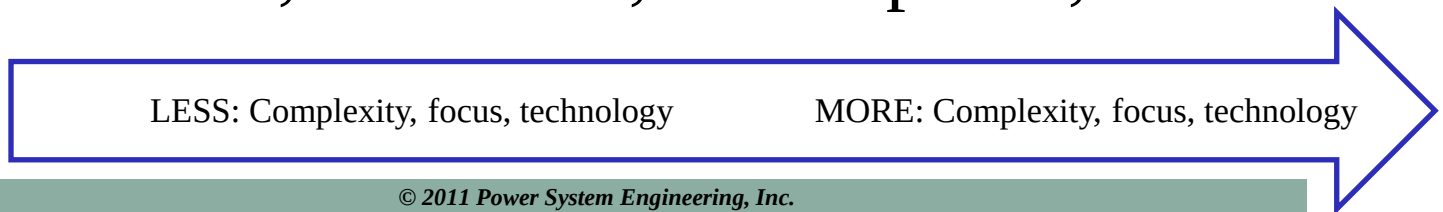
- With the support of the smart grid, what types of retail pricing can be used to better communicate to consumers the value of control or the cost of consumption during times of high load, prices or system constraints?

POWER SUPPLY COST ALIGNMENT

- Diverse G&T Cooperative wholesale rate structures.
  - Demand/Energy
  - TOU Energy
  - DSM Rates.
- The wholesale rate structure may or may not align with underlying cost structure.
  - This may not be the only or even primary goal.
- In large part, retail rates are passing through the wholesale rate structure.
- Flat averaged rates ➔ dynamic pricing.

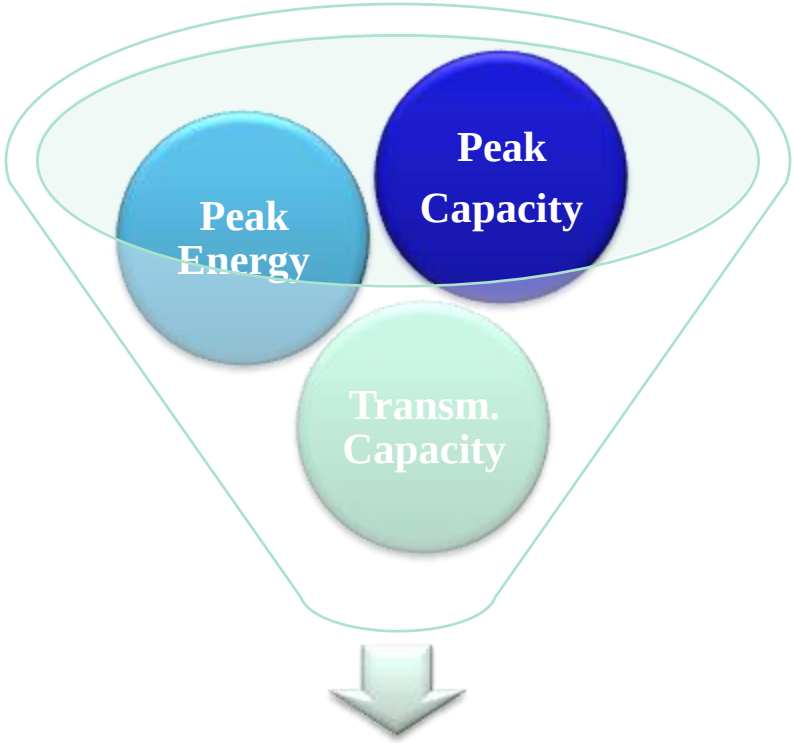
POWER SUPPLY COST ALIGNMENT

- For many G&T's energy costs are determined in an RTO via day ahead or real-time energy markets.
- Smart grid allows you to convey these prices and/or the G&T cost structure to the member-consumer.
- Energy savings based on changing time of use.
- Capacity savings if avoiding/deferring capex.
- There is no ONE perfect rate design.
- 2010's Customer Choice = When to buy power/what rate plan.
- Consider: TOU, CPP/PTR, Interruptible, RTP rates.



RETAIL RATE DESIGN: TIME-OF-USE

- Not a new rate design.
- Requires some time differentiated power supply costs.
- Considerations:
  - Narrow window
  - At least 2x's multiple
  - Otherwise, simple.
- AMI brings much greater flexibility and understanding of utility/member impact.
  - Design.
  - Revenue erosion.
  - Bill impacts.



Retail On-Peak Energy Charge Adder

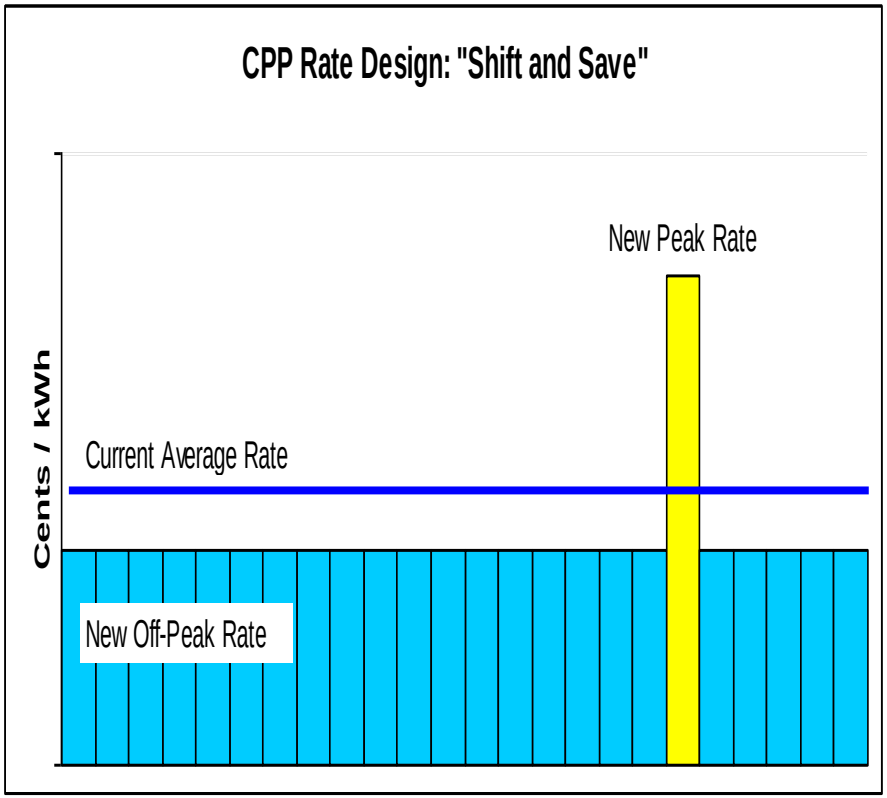
RETAIL RATE DESIGN: TIME-OF-USE

- Many cooperatives have struggled to build a robust TOU rate program.
  - Optional rates.
  - Not a focus.
  - Low acceptance or take rate.

TOU	KY COOP	MN COOP	CO COOP
Year Started	2009	1982	1985
Participation Rate	0.1%	0.1%	2.0%
Peak Adder	2.5x's (+10¢/kWh)	2.5-3.5x's (+12¢/kWh)	3.8x's +(11¢/kWh)
Notes	Target is ETS	Participation ↓ Differential ↑	Participation ↑

RETAIL RATE DESIGN: CPP/PTR

- TOU on steroids.
- Does require some time differentiated power costs.
- Does not require power supply CPP.
- Considerations:
  - G&T coordination of price signal/notification.
  - # of hours.
  - Risk sharing.
- AMI: 2-way communication, data for design, revenue/bill impact, M&V.



RETAIL RATE DESIGN: INTERRUPTIBLE RATE

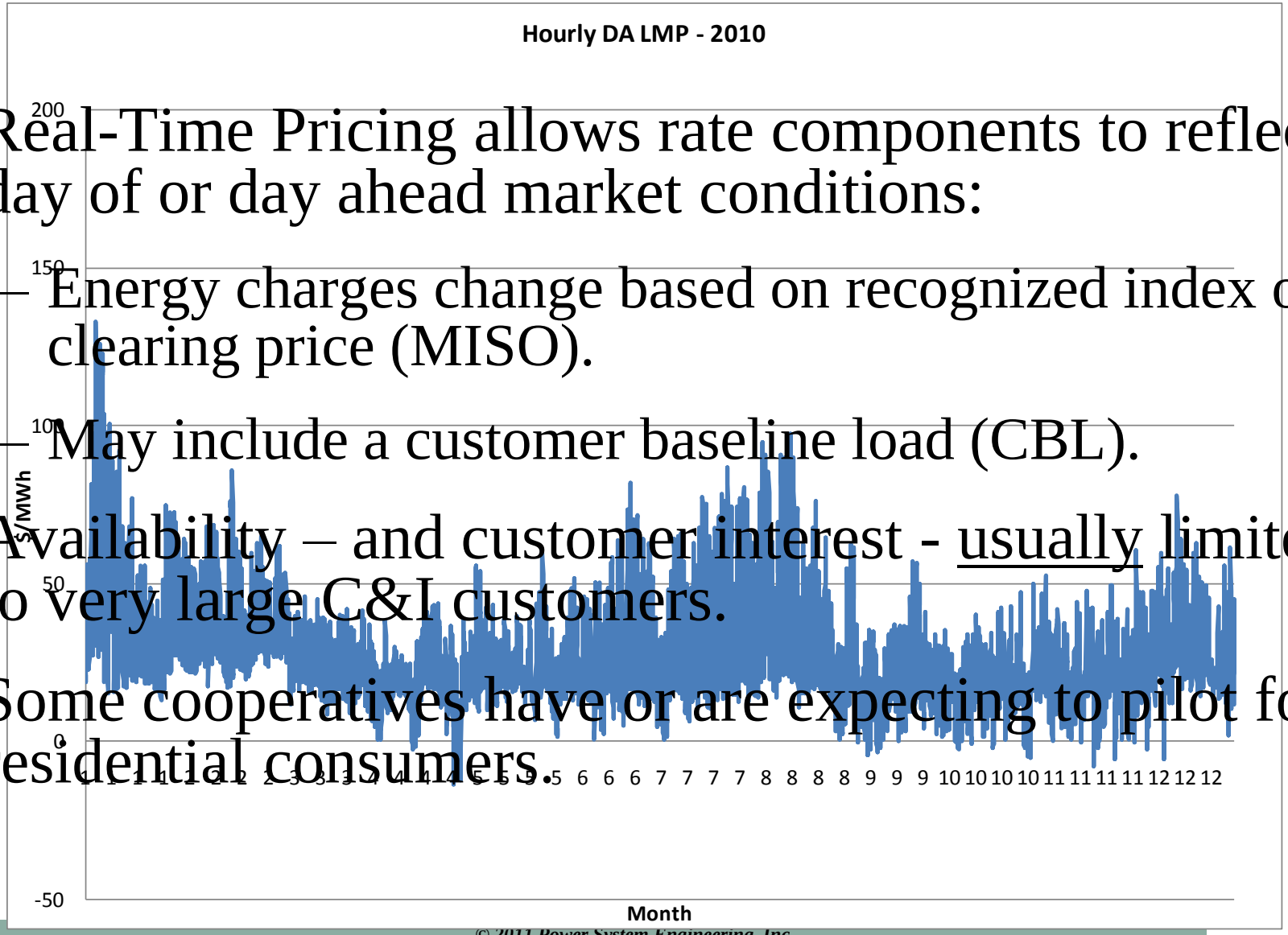
Customer Charge	$75.00/mo.
Coincidental Demand:	
Summer (June-Aug)	$21.50/kW
Winter (Dec-Feb)	$15.25/kW
Other	$12.00/kW
Non-Coincidental Demand	$3.50/kW
Energy Charge	
On-Peak Energy	$0.050/kWh
Off-Peak Energy	$0.040/kWh

Wholesale Demand Charge + Losses

~Wholesale Energy Charge + Losses

- Very focused and strong price signal. Sometimes too much.
- Most common in C&I applications. Consumer-owned generation, irrigation, grain drying.

Retail Rate Design: Real-Time Pricing



- Real-Time Pricing allows rate components to reflect day of or day ahead market conditions:
  - Energy charges change based on recognized index or clearing price (MISO).
  - May include a customer baseline load (CBL).
- Availability – and customer interest - usually limited to very large C&I customers.
- Some cooperatives have or are expecting to pilot for residential consumers.

WHAT DOES THE FUTURE HOLD?

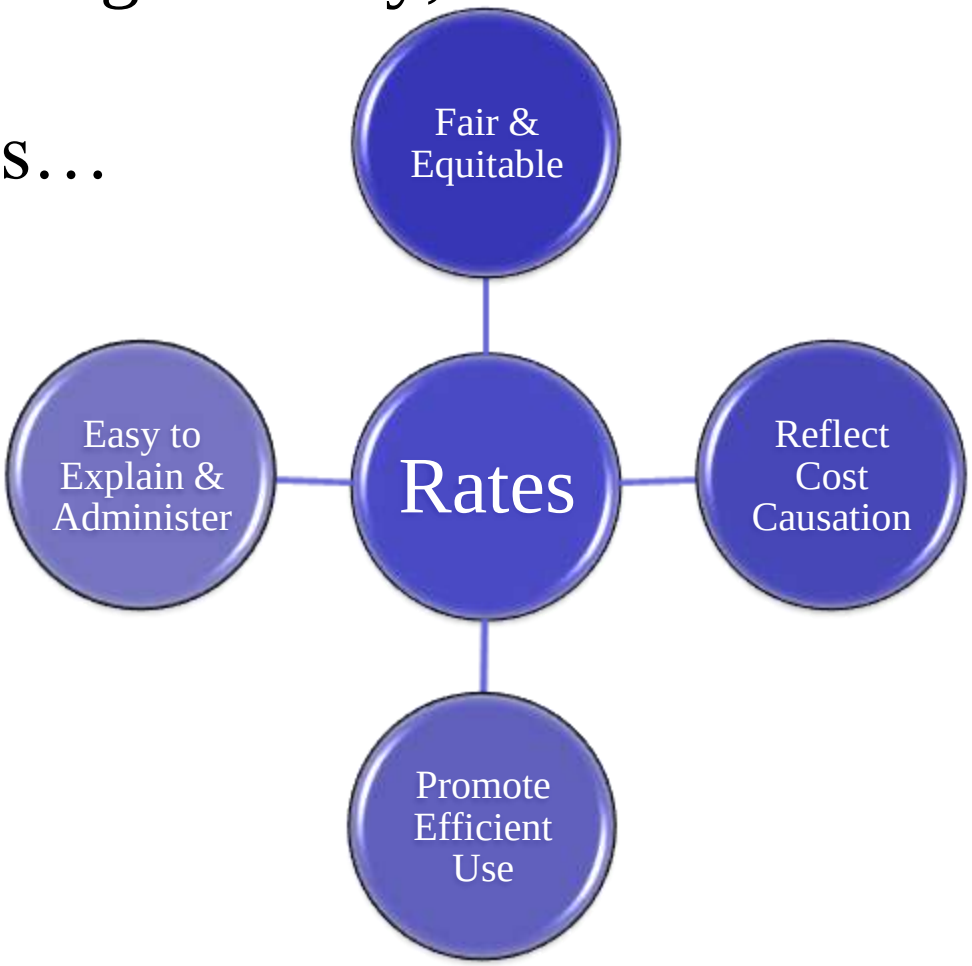
- Impact of economy, energy policy, plant retirements, etc. on capacity position and market prices.
  - Which can have influence on wholesale rate design and price signals.

    Past = short ➔ present = long ➔ future = ????
- Better data available to align retail COS and rates.
- Dynamic pricing programs are likely to be more prevalent.
- Temptation to over-complicate rates.

SUMMARY

- Electricity pricing (wholesale and retail) involves the consideration and balancing of many, and often times competing objectives.
- Smart grid helps address…

  …through the availability of data for analysis, rate development, billing, impact assessment, consumer usage information and measurement & verification.



Thank You!

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