

Overview of Utility Financial Operations for Boards and Councils

Presentation by Utility Financial Solutions, LLC



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Utility Financial Solutions, LLC

- International consulting firm providing cost of service and financial plans and services to utilities across the country, Canada, Guam and the Caribbean
- Instructors for cost of service and financial planning for APPA, speakers for organizations across the country, including AWWA.



Objectives

- ▶ Basic understanding of cost structure and its impact on rates
- ▶ What information does a cost of service study provide and how is it used
- ▶ Current rate design trends
- ▶ How rate designs are changing to reflect future industry trends



3

Overview of the Rate Setting Process



4

Why is Cost of Service Important?



- ▶ Cost of service is:
 - A method to equitably allocate the revenue requirements of the utility among the various customer classes of service
 - *What revenues should I recoup from whom and how should I do it?*



5

Three Important Objectives of COS

- ▶ ONE: Ensure rates recover costs to provide service to customers (Revenue Requirements)
- ▶ Objective Two: Defines optimal rate structure
 - Customer Charge
 - kWh Charge
 - Demand Charge
 - Power Cost Adjustment
- ▶ Objective Three: Reduce cross between classes



6

Cost of Service and Customer Classes

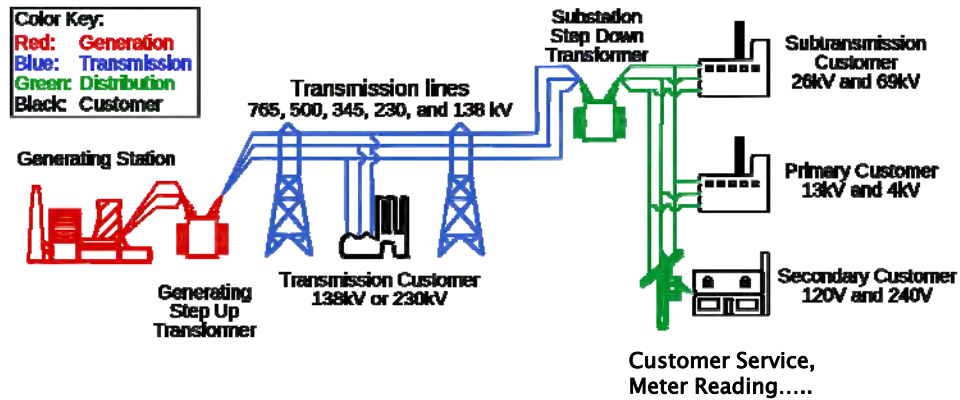


Why Costs Vary by Customer Class

- ▶ Costs vary because customers use electricity differently – grouped according to similar usage
 - Residential, Commercial, Industrial
- ▶ Delivery of electricity consists of mainly four components:
 - Power Supply
 - Local Production
 - Purchases
 - Transmission
 - Distribution System
 - Customer Specific Costs



Basic Overview of Electric System



9

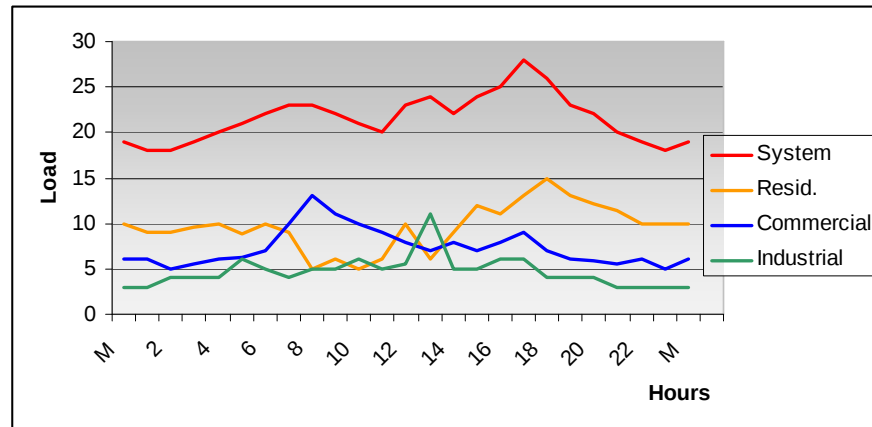
Power Supply Costs by Class of Customer

- ▶ Demand related power costs
 - Some customers contribute a greater amount to the peak demands of the system
- ▶ Energy related power costs
 - Power costs can vary by season or time
 - Some customers use more energy during on-peak hours



10

Load Data Example



This is an example, not Riverside's data

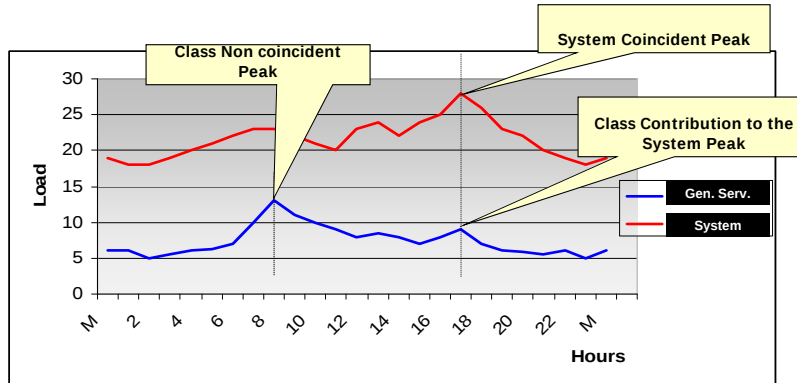
11

Distribution Costs

- ▶ Identifies the cost to operate and maintain the distribution infrastructure
- ▶ Customers are served at different voltage levels:
 - Sub transmission – Customer avoids all the distribution system infrastructure
 - Primary Voltage – Customer owns transformer and service drop
 - Secondary Voltage – Uses all the infrastructure of the distribution system

12

Relationship of Coincident to Non coincident Peak Demands



This is an example, not Riverside's data



13

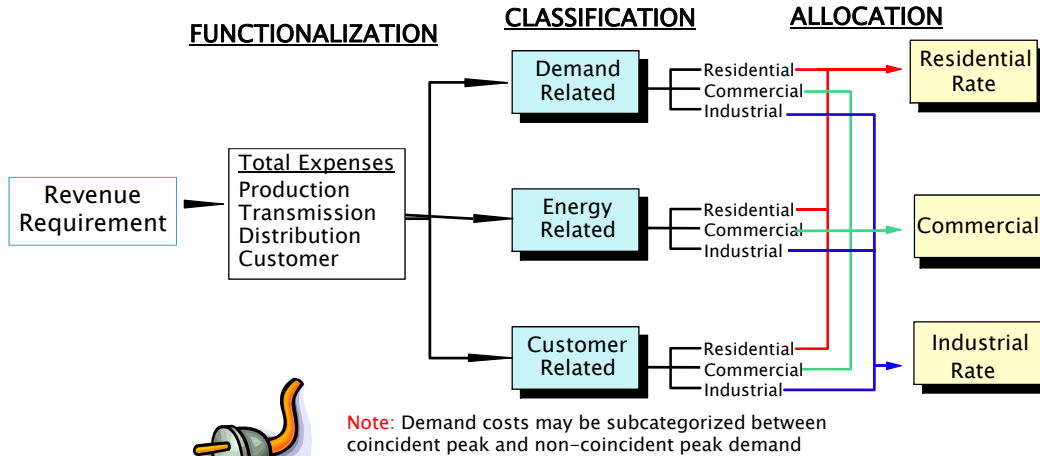
Customer Charges

- ▶ Costs that do not vary with usage:
 - Meter operation, maintenance and replacement costs
 - Meter reading
 - Billing Costs
 - Customer Service
 - Portion of Distribution System (35-50%)



14

Overview of a Electric Cost of Service Study



15

COS and Rate Subsidization

Cost of Service Summary

Customer Class	Cost of Service	Projected Revenues	Change to Meet COS
Residential Service Rate A	3,310,810	3,048,700	9%
General Secondary Service - Rate B	2,189,888	1,973,674	11%
Street Lighting	120,840	106,000	14%
Secondary Demand/Energy Service - Rate C	2,613,477	2,632,694	-1%
Primary Demand/Energy Service - Rate D	13,205,053	13,425,300	-2%
Total	21,440,068	21,186,368	1.2%
Revenue Increase Needed		\$ 253,700	

This is an example, not Riverside's data



17

Reduce cross –subsidization between classes

- Certain rate classes can be subsidizing other rate classes.
 - Example: Industrial class subsidizing the residential and commercial



18

Subsidization – When an overall increase is needed

- Move toward cost to serve using a bandwidth on customer classes:
 - If trying to achieve an overall 1.2% increase, no class will receive more than 3.2% ($1.2+2=3.2$) increase, no class less than -0.8% ($1.2-2=-0.8$) increase.
- This gives the rate design room to move classes closer together without rate shock to any one class



19

Subsidization – When an overall increase is needed

Customer Class	Cost of Service	Projected Revenues	Change to Meet COS	Rate Adjustments	Revenue Adjustment
Residential Service Rate A	3,310,810	3,048,700	9%	3.2%	\$ 97,558
General Secondary Service - Rate B	2,189,888	1,973,674	11%	3.2%	63,158
Street Lighting	120,840	106,000	14%	3.2%	3,392
Secondary Demand/Energy Service - Rate C	2,613,477	2,632,694	-1%	0.8%	21,062
Primary Demand/Energy Service - Rate D	13,205,053	13,425,300	-2%	0.5%	67,127
Total	21,440,068	21,186,368	1.2%	1.2%	\$ 252,296
Revenue Increase Needed		\$ 253,700			

This is an example, not Riverside's data



20

Rate structure far from COS?



Customer Charges

- Increasing customer charges helps stabilize revenues
 - Declining sales
- Reduces subsidy between year-round customers and seasonal customers
- Low income not the same as low use
 - *At most utilities, low income customers tend to be higher than average users. A higher customer charge may benefit low income depending on housing mix* (Have to check demographics at your specific utility)



Correction of Customer Charges

- ▶ Correct during rate changes
- ▶ Revenue neutral rate adjustment when increases are not required
 - Customer charge increased
 - Energy charge decreased
- ▶ Set a plan to move in increments over time
- ▶ Look at impact by usage and dollar



23

COS Results

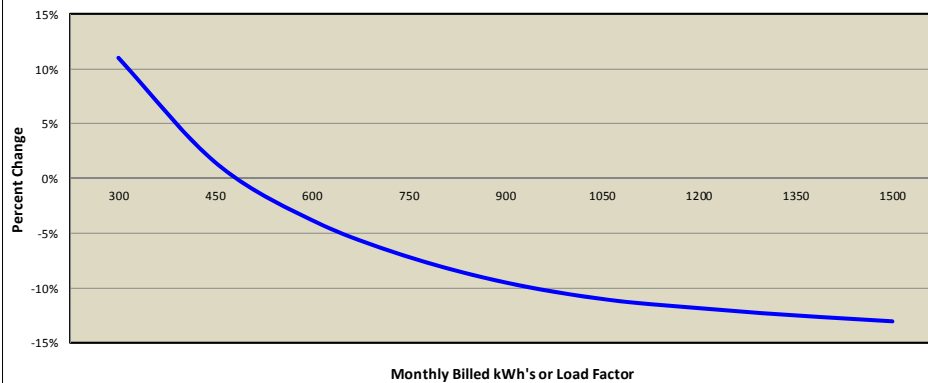
Customer Class	Current Customer Charge	COS Customer Charge	Difference
Residential	\$ 6.80	\$ 16.83	\$ 10.03
General Service	10.80	84.80	\$ 74.00
Large Power	50.00	154.51	\$ 104.51



24

Current Rates		Proposed 2014 Rates		Cost of Service Rates	
Monthly Customer Charge:		Monthly Customer Charge:		Monthly Customer Charge:	
All Customers	\$ 6.80	All Customers	\$ 16.83	All Customers	\$ 16.83
Energy Charge:		Energy Charge:		Energy Charge:	
Winter Block 1 (0 - 1000 kWh)	\$ 0.0744	Winter Block 1 (0 - 1000 kWh)	\$ 0.0685	Winter	\$ 0.0750
Winter Block 2 (1001 - Excess kWh)	\$ 0.0700	Winter Block 2 (1000 - Excess kWh)	\$ 0.0685	Summer	\$ 0.0890
Summer Block 1 (0 - 1000 kWh)	\$ 0.0744	Summer Block 1 (0 - 1000 kWh)	\$ 0.0800		
Summer Block 2 (1001 - Excess kWh)	\$ 0.0700	Summer Block 2 (1000 - Excess kWh)	\$ 0.0800		
Fuel Adjustment(PCA) (0 - 0 kWh)	\$ 0.01862	Fuel Adjustment(PCA) (0 - 0 kWh)	\$ -		
Revenues from Current Rates	\$ 4,597,848	Revenues from Proposed Rates	\$ 4,598,664	COS Revenues	\$ 4,915,075
Model Proof to Financial Statements	0.23%	Percentage Change from Current	0.02%		

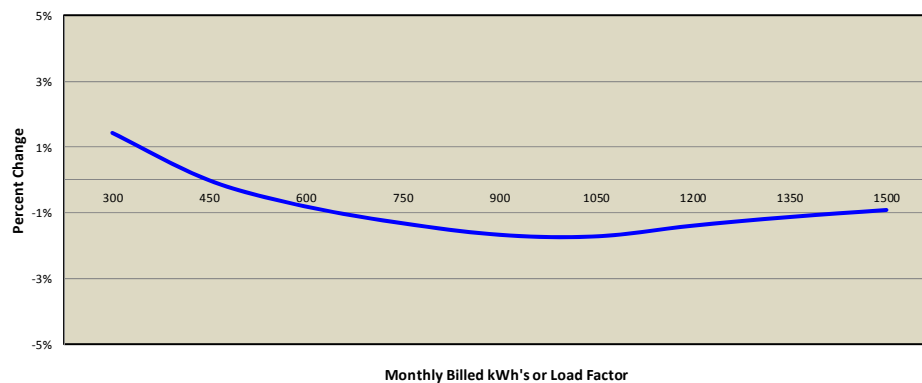
Customer Bill Impacts for Residential - In Proposed 2014 Rates



25

Current Rates		Proposed 2014 Rates		Cost of Service Rates	
Monthly Customer Charge:		Monthly Customer Charge:		Monthly Customer Charge:	
All Customers	\$ 6.80	All Customers	\$ 8.30	All Customers	\$ 16.83
Energy Charge:		Energy Charge:		Energy Charge:	
Winter Block 1 (0 - 1000 kWh)	\$ 0.0744	Winter Block 1 (0 - 1000 kWh)	\$ 0.0880	Winter	\$ 0.0750
Winter Block 2 (1001 - Excess kWh)	\$ 0.0700	Winter Block 2 (1000 - Excess kWh)	\$ 0.0880	Summer	\$ 0.0890
Summer Block 1 (0 - 1000 kWh)	\$ 0.0744	Summer Block 1 (0 - 1000 kWh)	\$ 0.0930		
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Revenues from Current Rates	\$ 4,597,848	Revenues from Proposed Rates	\$ 4,598,313	COS Revenues	\$ 4,915,075
Model Proof to Financial Statements	0.23%	Percentage Change from Current	0.01%		

Customer Bill Impacts for Residential - In Proposed 2014 Rates



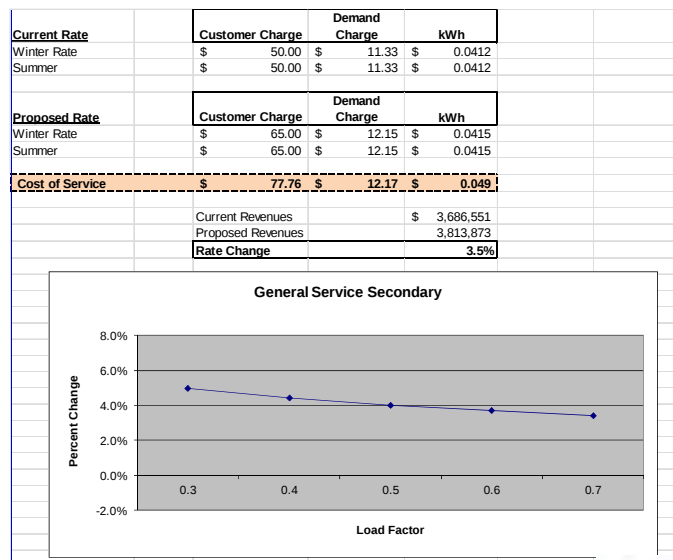
26

Demand Example



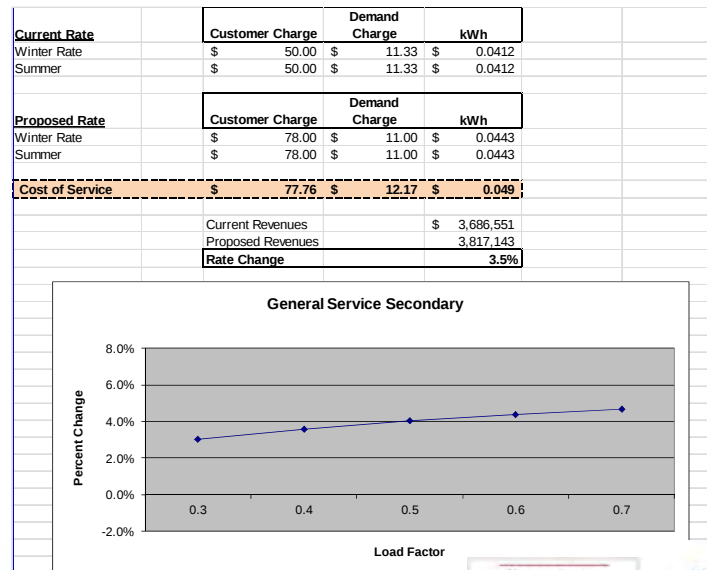
27

Example of Proper KW Charge



28

Too much in kWh cost recovery?



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Distribution Recovery

- ▶ For demand rate customers, most inaccurate method of distribution cost recovery is through a kWh charge
- ▶ Distribution system is constructed to handle a customers peak demand or a classes peak demands and are not constructed to handle kWh's
 - Typically billed on peak monthly demand

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Example of Distribution Recovery Using kWh's and KW

Method of Distribution Recovery					
Demand Rate	\$	5.90			
kWh Charge		0.0223			
Load Factor		20.0%	30.0%	40.0%	50.0%
Peak Demand		1,000	1,000	1,000	1,000
kWh's Used by Customer		146,000	219,000	292,000	365,000
Demand Rate		5,899	5,899	5,899	5,899
Energy Rate		3,259	4,888	6,517	8,147
Difference		(2,640)	(1,011)	619	2,248

- For this example, recovery on kWh and kW would produce the same cost recovery
- The example customers all create the same demand on the distribution infrastructure
- The kWh method produced a subsidy for low load factor customers from high load factor customers



31

Rate Design



Proper Rate Design

- ▶ Proper Rate structure = Fixed and Variable costs
- ▶ Customer charge – Recover fixed costs of meter reading, billing, customer service, and a portion of maintenance and operations of the distribution system
- ▶ Demand charge –
 - Demand component of power supply
 - Distribution component
- ▶ KWh – In general, variable portion of power supply
- ▶ PCA – Pass through for changes in power supply



33

Current Designs Simplified Example

	Monthly Charge	First 500 kWh	Over 500 kWh
Flat	\$ 10.00	\$ 0.08	\$ 0.08
Declining	10.00	0.09	0.07
Inclining	10.00	0.07	0.09



34

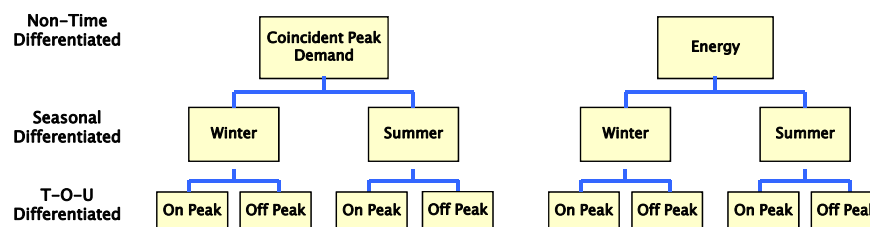
Current Rate Structures

- ▶ Flat Rate Structures – Easy to understand and administer
- ▶ Declining Block Rate Structures – Can create the most revenue stability
- ▶ Inclining Block Rate Structures –
 - Usually a 25% rate differential in blocks for customers to respond
 - Many Inclining block rate structures shifted to much of the fixed cost recovery into latter blocks adversely impacting utility financial statements
- ▶ Time Differentiated Rates



35

Time and Seasonal Differentiation Rate Design



- Seasonal
 - Winter
 - Summer
- Time of Use (TOU)
 - On peak
 - Off peak



36

Time and Seasonal Differentiation

- ▶ Advantages
 - More closely tracks costs
 - Gives price signals brackets
- ▶ Disadvantages
 - Metering
 - Require more customer attention
 - Cost differential between time periods may not be large enough to off-set administration/billing costs
 - Budget billing can hide price signal for seasonal rates



37

Why These Worked Historically

- ▶ Greatly generalized, residential customers woke up, took a shower, went to work, came home, turned on the lights, cooked dinner, watched TV, did a load of laundry, went to bed.
- ▶ Each customer in the residential class looked an awful lot like the next - utilities could lump energy and demand elements together into \$/kWh price.
- ▶ Today residential customers are not the same. Smart thermostats, plug-in electric vehicles, rooftop solar, demand-flexible water heaters, battery energy storage, and myriad of other technologies that make their loads and consumption patterns potentially very different.

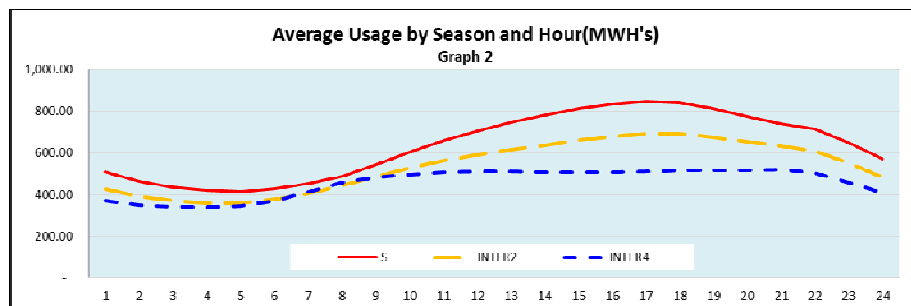
38

Distributed Energy Resources Difference in Resources



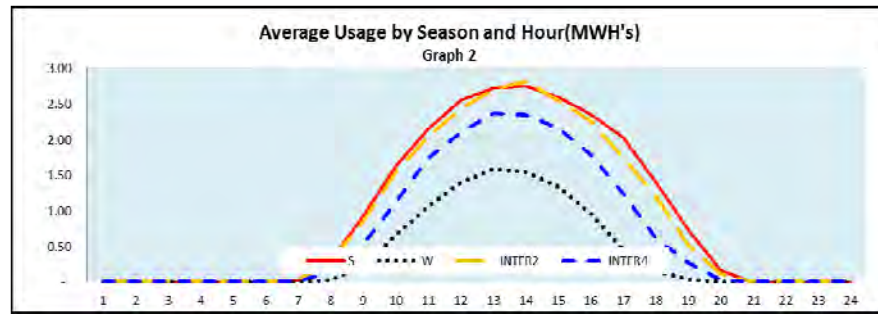
39

Sample System Load Curve



40

Solar Production Curve (Sample)

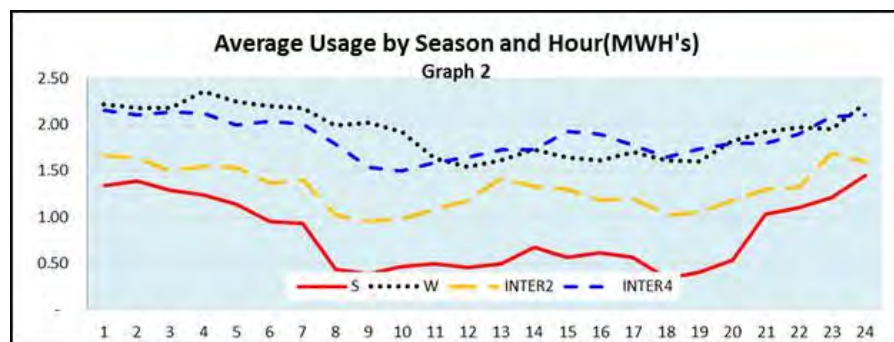


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Wind Production Curve (Sample)

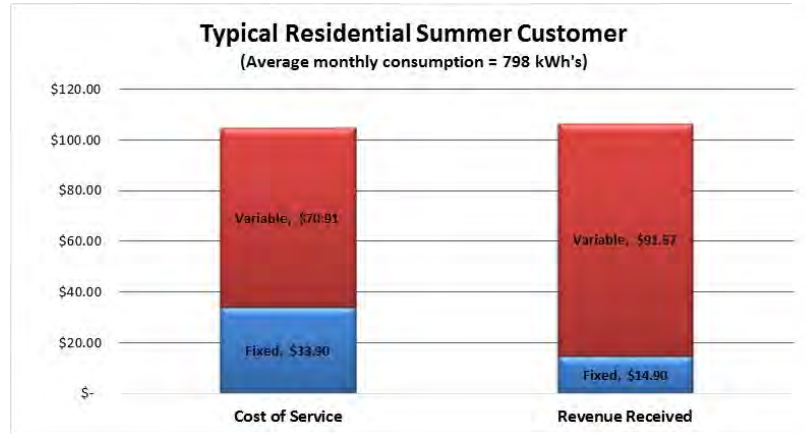


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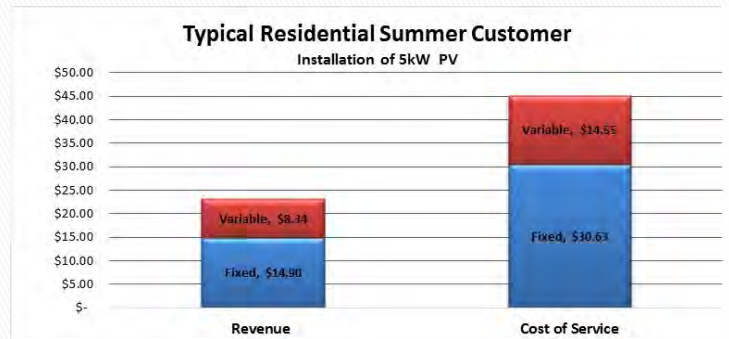
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Comparison of Fixed and Variable



Comparison of Fixed and Variable After Net Metering



Comparison with Utility that Purchases Power Supply

- PV unit installation - 5kW
- Midwest PV Unit - 2013 data
- PV production - 725 kWh
- Customers Peak Distribution Demand - Before PV - 5.16 kW; after PV 3.59 kW
- Customer Peak to System Demands - Before PV 2.11 kW; after PV 0.61 kW



Issues with Net Metering

- ▶ Whenever subsidies occur, it will cause problems in the future.
 - Customer has relied on the price signal to install the solar unit
 - At some point the subsidy will need to be removed
- ▶ Billing and Metering Options (Depends on metering and billing capabilities)
 - Net Metering additional charge
 - Buy All/Sell All
 - Net Billing



45

Billing and Meter Options

- ▶ Net metering with additional charge for distribution recovery
 - Difference between what they take off the system and what they give back. (1,000 take, gave 600, billed 400)
 - Additional charge for distribution under recovery
 - Can be negatively viewed by customer, "why am I paying more?"



46

Billing and Meter Options

- ▶ **Avoided Cost recovery**
 - Measures how solar reduces energy and capacity on power supply side, as well as long run marginal cost on distribution system (reduce need for capacity addition)
- ▶ **Buy all sell all (two meters)**
 - Took 1,000, gave back 600, solar produced 800. (Solar metered separately)
 - House used 1,200 ($1,000 + 800 - 600$)
 - Billed retail at 1,200; credited avoided cost at 800
- ▶ **Net Billing**
 - Took 1,000, gave back 600. Billed retail at 1,000 and avoided cost credit at 600.



47

“Ideal” Rate Structure

Example "Ideal" Rate Structure	EXAMPLE Rate
Power Supply Customers Demand Coincident with System Peak	\$ 12.72
Distribution Recovery Based on Customers Maximum Demand	2.19
Energy Charge (Seasonal, TOU)	0.0442
Customer Charge	21.44
Transfer to the General Fund	7%



48

“Ideal” Rate Strategies

- ▶ Add utility of the future – Small periodic increases to keep up with inflation
 - 0–5% – inflationary
 - 5–9% – a few large industrials
 - Double digits = complaints
- ▶ Phase in large increases over time
- ▶ When possible, implement Increases in the transition month = Transparent
- ▶ Survey of local rates (positive and negative)
 - ▶ Structure apple to apples?
 - ▶ What kind of rates do they need to not care what customer are doing behind the meter –



49

Questions?



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