



Unraveling the Mystery of Rates and How They are Set

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the Financial Engineering Company

Purpose of Presentation

- Rates 101
- Better understand
 - How rates are set
 - Why they are at a certain level (or should be)
- Gain insight into why renewable energy is hard to afford
- Not to make you a rate expert

First the boring...a few terms



Financial Terms

- Capital expense: Expense for an asset that has an expected life greater than one year.
- Operating expense: Expense for day-to-day operations/maintenance or for a short-lived asset
- Depreciation/Amortization: A non-cash expense used to recover the costs of an asset over time.
 - $\text{Cost of asset} / \text{expected life} = \text{Depreciation}$
- Fixed costs: Costs of the utility that do not change with energy sales (base salaries, depreciation, debt payments, etc.)
- Variable costs: Costs of the utility that do change with energy sales (fuel, overhauls, etc.)

Rate Components

- Base Rate
 - Used to recover non-fuel costs and (sometimes) part or all fuel costs
 - Customer (\$/month regardless of usage)
 - \$/kWh applied to energy used by customer
 - \$/kW applied to large customers based on the customer's peak usage during the month
- Fuel Cost Charge
 - Used to recover fuel and purchased power costs
 - \$/kWh

A Work About Utility Structures

- Investor owned / Municipal / Cooperative
- Stand Alone
 - All costs of utility borne by ratepayers
- Municipal
 - Labor and other costs may be shared among different utilities within municipality
- Regional
 - Costs of headquarters shared by all
 - All member utilities might share in all pooled costs

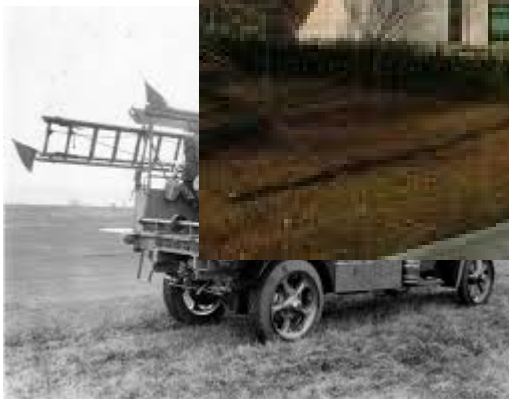
How Does a Utility Incur Costs?



- Infrastructure



dreamstime.com



How Does a Utility Incur Costs?

- Operations and Maintenance



Fuel (Base cost + interest on loans)



Labor



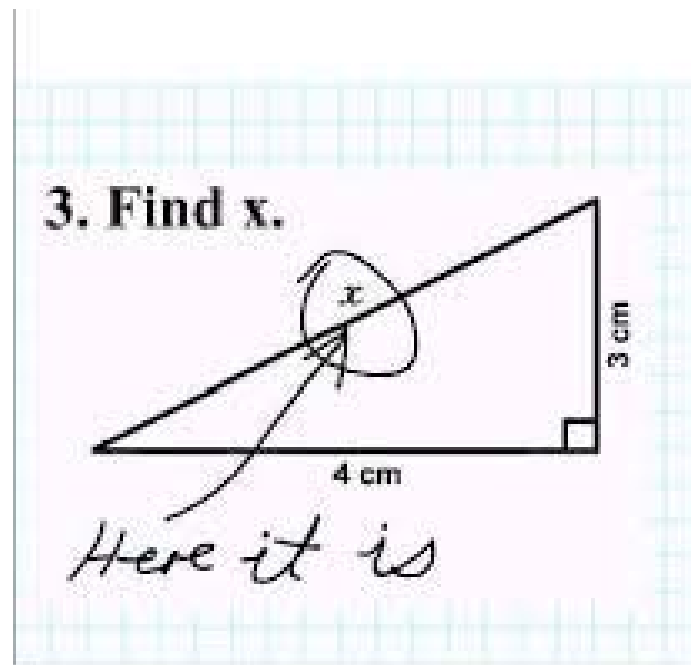
Maintenance / Repairs



Meter Reading, etc.

Putting It All Together

- It may sound complex, but really, it's more common sense than anything else.....



Goal in Setting Rates

- Rates must be set to allow revenues to be equal to or greater than expenses
- Allows build-up of capital (dollars) to fund future improvements/replacements
- If not:
 - Can't get loans for capital expenditures or fuel
 - Utility falls into state of disrepair
 - No power
 - Grants harder to acquire
 - Someone else will run the utility
- Price Signals (not discussed today)

	Annual Expense
Fuel Costs	
Fuel	\$ 1,750,000
Interest on Loan	26,250
Labor	
Generation	350,000
Distribution	225,000
Meter Reading	12,000
General	150,000
Generation O&M	150,000
Lube Oil, etc.	12,000
Distribution O&M	75,000
Administrative	
Insurance	250,000
Utilities	12,000
Other	60,000
Vehicle Fuel	25,000
Subtotal	<u>\$ 3,097,250</u>
Interest on Debt	75,000
Depreciation/Amortization	
	Original Cost Life
Overhauls	500,000 3 166,667
Generators	2,000,000 20 100,000
Buildings	500,000 30 16,667
Vehicles	30,000 5 6,000
Vehicles	50,000 5 10,000
Total Expenses	<u>\$ 3,471,583</u>

How a utility might format it

Generation	
Fuel	\$ 1,750,000
Other	<u>512,000</u>
Total Generation	\$ 2,262,000
Distribution	300,000
Customer Accounts/Service	12,000
Administrative	497,000
Interest on Debt	
Short-term	26,250
Long-term Debt	75,000
Depreciation/Amortization	<u>299,333</u>
Total	<u>\$ 3,471,583</u>

Infrastructure

Other than fuel, most costs are fixed

Total Revenue Requirements

Revenue Requirements	\$ 3,471,583
Less Other Revenues	(25,000)
Margin (Profit)	<u>250,000</u>
	\$ 3,696,583

Fuel	\$ 1,776,250
Other	<u>1,920,333</u>
Total	\$ 3,696,583

Rates

(At the risk of Oversimplification)

Assume

	Customers (Avg/month)	Energy (kWh/yr)
Residential	750	3,600,000
Commercial	250	1,500,000
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	1,000	5,100,000
Customer Charge:		
Residential		\$ 15.00
Commercial		\$ 30.00

Energy Charge for Commercial \$0.01/kWh less than Residen

Revenue Requirements

Fuel	\$ 1,776,250
Other	<u>1,920,333</u>
Total	\$ 3,696,583

Rate Derivation

Fuel Cost Adjustment	
Fuel Cost	1,776,250
Energy Sales (kWh)	5,100,000
Rate (\$/kWh)	\$ 0.348
Non Fuel Revenue Requirements	\$ 1,920,333
Less Customer Revenues	
Residential (750 x 12 x \$15)	(135,000)
Commercial (250 x 12 x \$30)	<u>(90,000)</u>
Net Revenues from Base Energy Rates	\$ 1,695,333

	Rate	Revenues
Base Energy Rate		
Residential	0.335	\$ 1,207,294
Commercial	0.325	<u>488,039</u>
		\$ 1,695,333

How A Utility Might Show It

Revenues		
Customer Charges	\$ 225,000	
Energy Charges	1,695,333	
Fuel Cost Adjustment	1,776,250	
Other	25,000	
Total		\$ 3,721,583
Expenses		
Generation	2,262,000	
Distribution	300,000	
Customer Accounts/Service	12,000	
Administrative	497,000	
Interest on Debt		
Short-term	26,250	
Long-term Debt	75,000	
Depreciation/Amortization	299,333	
Total Expenses		3,471,583
Net Margin		\$ 250,000

- Based on a single block rate for each rate class
- Other options:
 - Inclining block
 - Declining block
 - Time of use
 - Seasonal
 - Demand charge
- Overall concept is for expected revenues to equal revenue requirements

Considerations

- Why a target margin?
 - Rates are set in advance. We don't know for sure what are expenses or sales will be.
 - Maintain adequate cash flow for capital additions
 - Debt covenants
- What is the purpose of depreciation?
 - Must recover costs
 - Spreads out recovery over time
 - Pays for principal on debt (timing issues)

Considerations

- Customer charge
 - Provides fixed income to utility regardless of energy usage by customer
 - Important when customers put in own generation for part of their own requirements
 - Other than fuel, most utility costs fixed
 - Lower sales, higher rate
 - Upward pressure on rates reduced with higher customer charges
- Remember how most costs other than fuel are fixed?

Why Is It So Hard to Put in Renewable Generation?

- Assume three wind turbines at 100 kW each
- Capital cost = \$1.2 million/turbine
- Average generation = 28% (735,840 kWh/yr)
- Usable energy = 85% (625,464 kWh)
- 90% Debt/10% Equity
- O&M / Replacements = \$50,000/year

How It Stacks Up

Fuel Savings	\$	(198,722)	
Depreciation		180,000	
Interest on Debt @ 3.0%		97,200	
O&M/Replacements		50,000	
Annual Additional Costs	\$	128,478	
Energy Sales		5,100,000	kWh
Net Rate Increase	\$	0.025	/kWh

Displacing fuel only and adding fixed costs to other fixed costs of the system.

- Conclusion of Rates 101
- Other Subjects:
 - Cost of Service allocations among rate classes
 - Rate Design/Price Signals
 - The effect of self generation on rates
 - Usable energy from renewable generation
 - And more.....