Gas Rate Design and Energy Efficiency

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JBS Energy, Inc.

- Consulting firm serving consumers, environmentalists, government agencies, and renewable energy producers since 1984
- Economic analysis of utility operations, plans, and rate design
- Manufacture and sell Aquacalc (handheld computer for surface water measurement)
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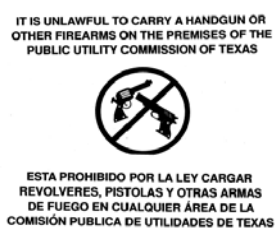
Rate Design Can Be Controversial



Back to Basics: Cost Allocation Drives Rate Design

- Allocation of Mains is Biggest Issue
  - Many Utilities Propose >50% Customer-Related
  - All Demand-Related
    - California, Washington, Maryland, Nevada (Sierra Pacific), Colorado
  - "Better" Customer-Related Methods
    - Zero intercept (using all the data a utility has – typically 20-30% customer)
    - Minimum Connect (urban footage – usually less than half the system)

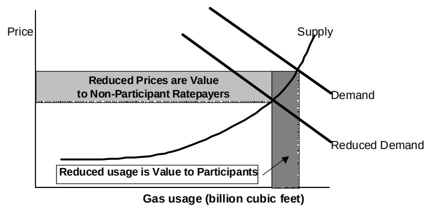
Other Cost Allocation Issues

- Meters and Services –customer-related but often over-allocated to residential customers
- Energy Efficiency Isn't a Customer Cost!
- Major Account Representatives – serve large customers, charged to small ones
- Other Operating Revenues – largely paid by residential for customer functions but often spread to everyone

Straight-Fixed Variable Isn't the Answer

- Harms low-income customers
  - EIA and BLS data, California and Arkansas studies show low-income use less gas
- Discourages Investments in Efficiency
  - Reduces Cost-Effectiveness of Efficiency
  - Driving with one foot on the gas and the other on the brake.
- Gas Efficiency Reduces Gas Prices Long-Term

Market Price and Value of Gas Demand Reduction



Garden Variety Rate Design

- Keep fighting customer charges
- Recognize that declining block rates – particularly high first blocks applying to small increments of use - are just as bad

Rate Tiering

- A Good Thing in Moderation – California has had them for 30 years
- Can provide incremental price signals
- Reflects higher costs of peak space conditioning service

Rate Tiering Concerns

- Gas use rises because of space heating
- Different block sizes in summer and winter
- Shoulder season issues
- Increases weather volatility to customers and utilities

Developing Tiered Gas Rates

- Compare second tier to average of customer charge + tier 1
- Set second tier moderately above this average after addressing other concerns

Competition with Electricity

- Gas uses less total energy and emits less Greenhouse Gases than electricity.
- An ELECTRIC RATE DESIGN issue.
  - Close promotional electric rates to new customers; reduce winter declining block differential gradually.
- A GAS REVENUE REQUIREMENT issue.
  - Gas companies can price themselves out of the market.
  - Gas Rate Design has little impact.

A Grand Compromise

- Arkansas AG Supported Gas Utility Decoupling
- BUT with a 3-Pronged Quid Pro Quo:
  - Stop the Utility's Mad Rush to Higher Customer Charges
  - Real Energy Efficiency Efforts
  - Less Risk Means Lower Return on Equity
- May not work everywhere, but...

Conclusions

- Cost Allocation Drives Rate Design
  - Mains and Other Items
- Straight Fixed Variable Isn't the Answer
- Careful Design of Tiered Rates Can Encourage Efficiency
- Facing Competition with Electricity? Regressive Gas Rate Design Won't Help

Energy Used by Electric and Gas End Uses, Modern Efficient Appliances

	gas	electric combined cycle	coal steam
gas vs. electric resistance heat			
end-use efficiency	90%	100%	100%
conversion and delivery efficiency *	98%	45%	31%
implicit heat rate Btu/kWh	3,870	7,630	10,900
efficiency	88%	45%	31%
energy required for end-use electricity relative to gas		197%	282%
CO_2 per MMBtu of heat input (pounds)	115	115	210
CO_2 for same useful output as 1 MMBtu of gas heat input	115	227	592
additional CO_2 for electric option		97%	414%
gas vs.air-source heat pump (Heating Seasonal Performance Factor = 8.2)			
end-use efficiency	90%	240%	240%
conversion and delivery efficiency	98%	45%	31%
implicit heat rate Btu/kWh	3,870	3,176	4,537
efficiency	88%	107%	75%
energy required for end-use electricity relative to gas		82%	117%
CO_2 per MMBtu of heat input (pounds)	115	115	210
CO_2 for same useful output as 1 MMBtu of gas heat input	115	94	246
additional CO_2 for electric option		-18%	114%
water heater			
end-use efficiency	63%	93%	93%
conversion and delivery efficiency	98%	45%	31%
implicit heat rate Btu/kWh	5,528	8,204	11,720
efficiency	62%	42%	29%
energy required for end-use electricity relative to gas		148%	212%
CO_2 per MMBtu of heat input (pounds)	115	115	210
CO_2 for same useful output as 1 MMBtu of gas heat input	115	171	445
additional CO_2 for electric option		48%	287%
clothes dryer			
end-use efficiency (relative to electricity to dry same amount of clothes)	89%	100%	100%
conversion and delivery efficiency	98%	45%	31%
implicit heat rate Btu/kWh (adjusted for slightly lower gas end-use drying efficiency)	3,926	7,630	10,900
efficiency	87%	45%	31%
energy required for end-use electricity relative to gas		194%	278%
CO_2 per MMBtu of heat input (pounds)	115	115	210
CO_2 for same useful output as 1 MMBtu of gas heat input	115	223	583
additional CO_2 for electric option		94%	407%

* Gas delivery losses between the site of a powerplant and a residence. Electric efficiency based on combined cycle heat rate of 7000 Btu/kWh, coal heat rate of 10000 Btu/kWh, 9% line loss.