Tariffs of the Future for Gas Utilities

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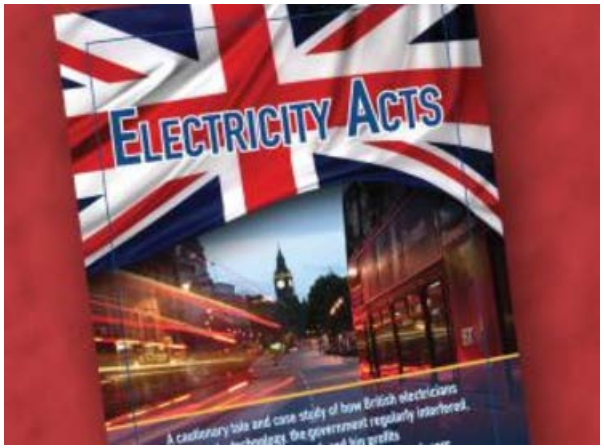
THE Brattle GROUP

A variety of disruptive technologies have begun to appear in customers' premises

Industry guru, Leonard Hyman, has summed up the industry's conundrum

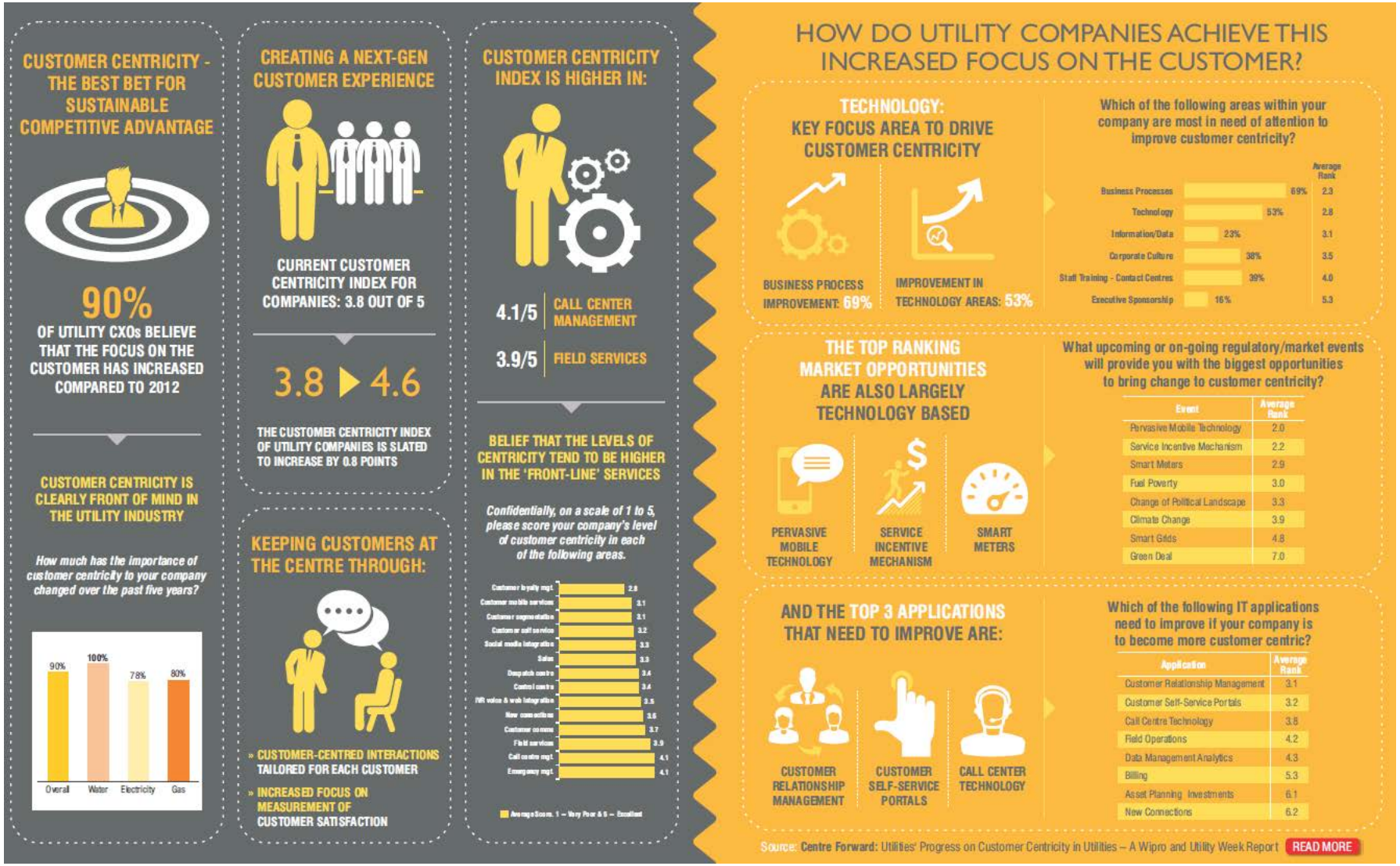


"Technology will change the business, but we don't know for sure how"

"And if decentralization and self-generation become the norm, it will become exceedingly difficult to force consumers to pay for the stranded assets at the utility"

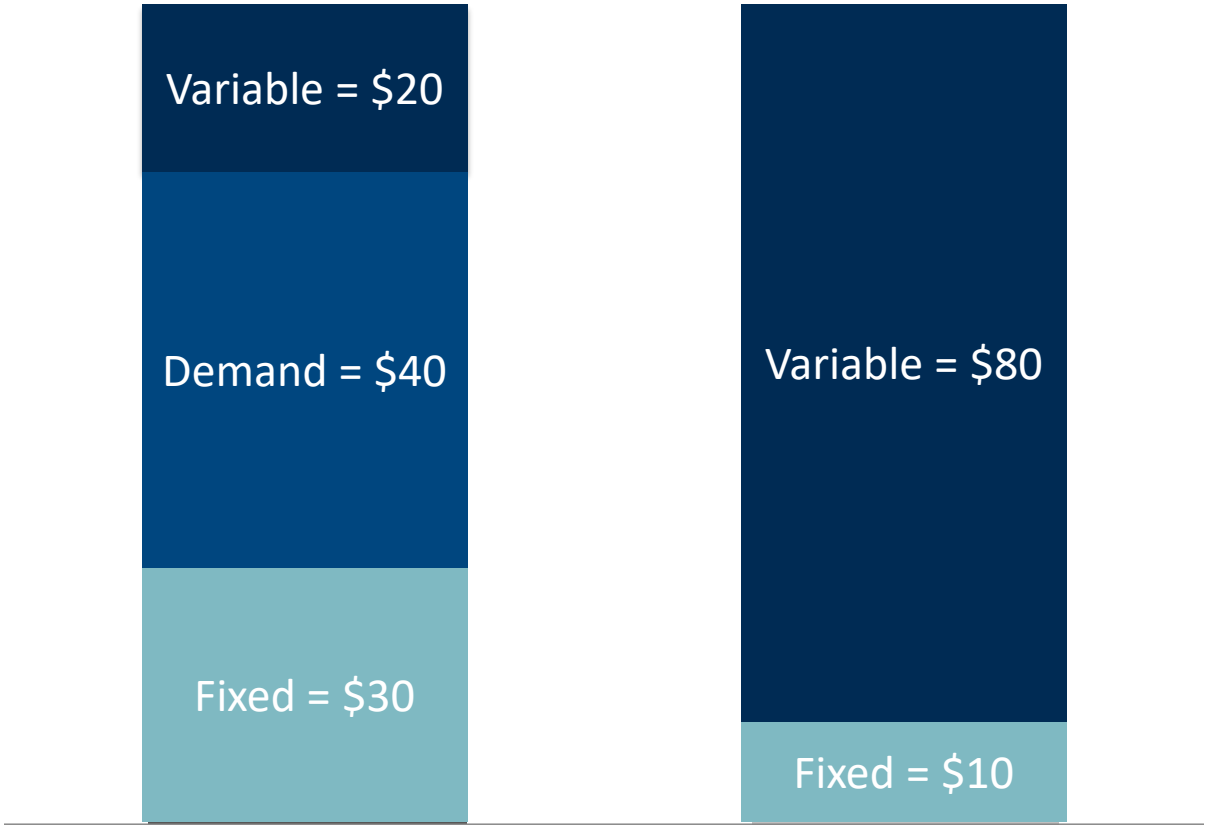
"Nobody could make former trolley car passengers pay for a service they did not use anymore, either"

The industry needs to become customer-centric with the rise of the empowered consumer



Rates are stuck in the past

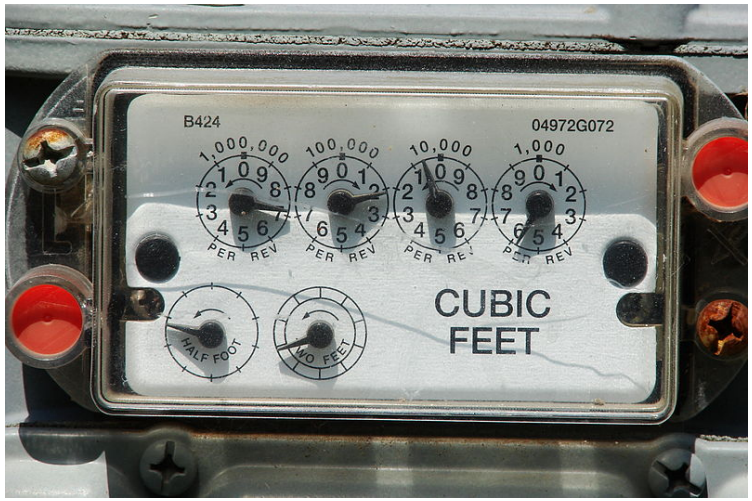
Cost categories	Utility's Costs	Customer's Bill
Variable ($/MMBtu) - Gas supply - Operations & maintenance	Variable = $20 Demand = $40	Variable = $80
Fixed ($/customer) - Metering & billing - Overhead		
Size-related (demand) ($/MMBtu/d) - Transmission capacity - Distribution capacity	Fixed = $30	Fixed = $10



Note: Illustrative example for a gas utility.

This transition can help

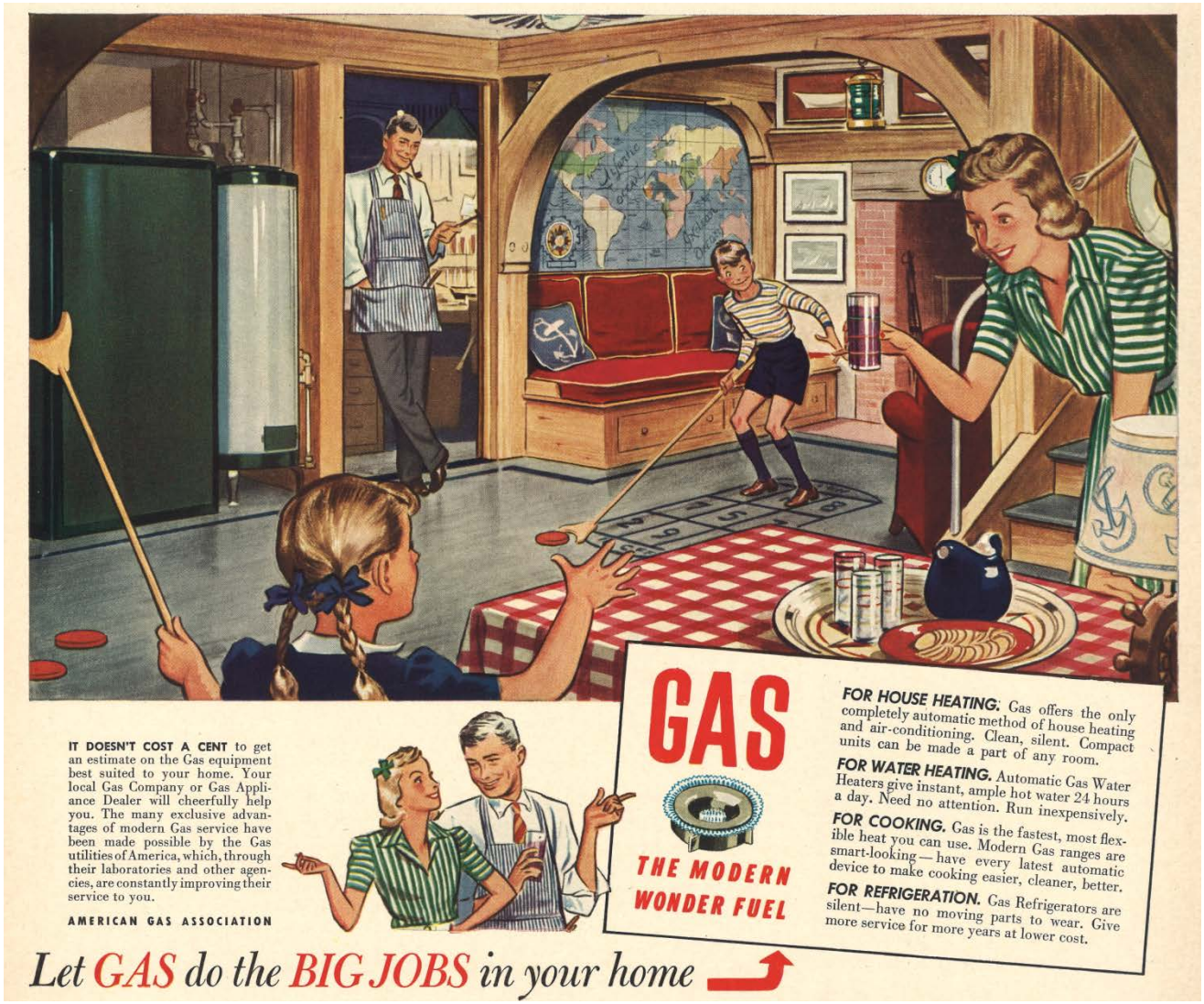
Traditional meter



Smart meter

…but there is also a need to consider how customers interact with the grid

Residential and commercial gas uses have been dominated by cooking, space heating…

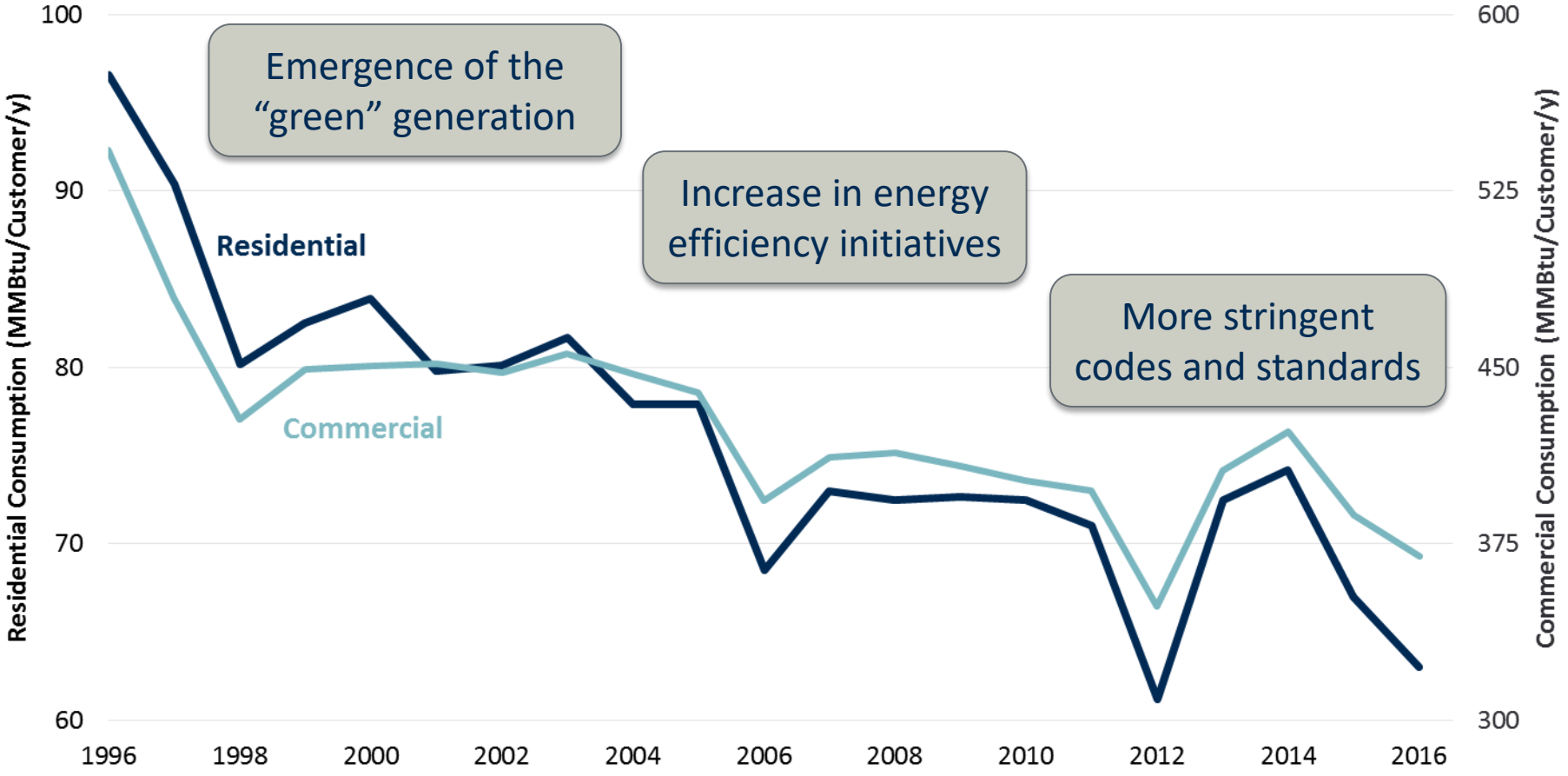


Source: AGA advertisement from the 1940s

… and water heating

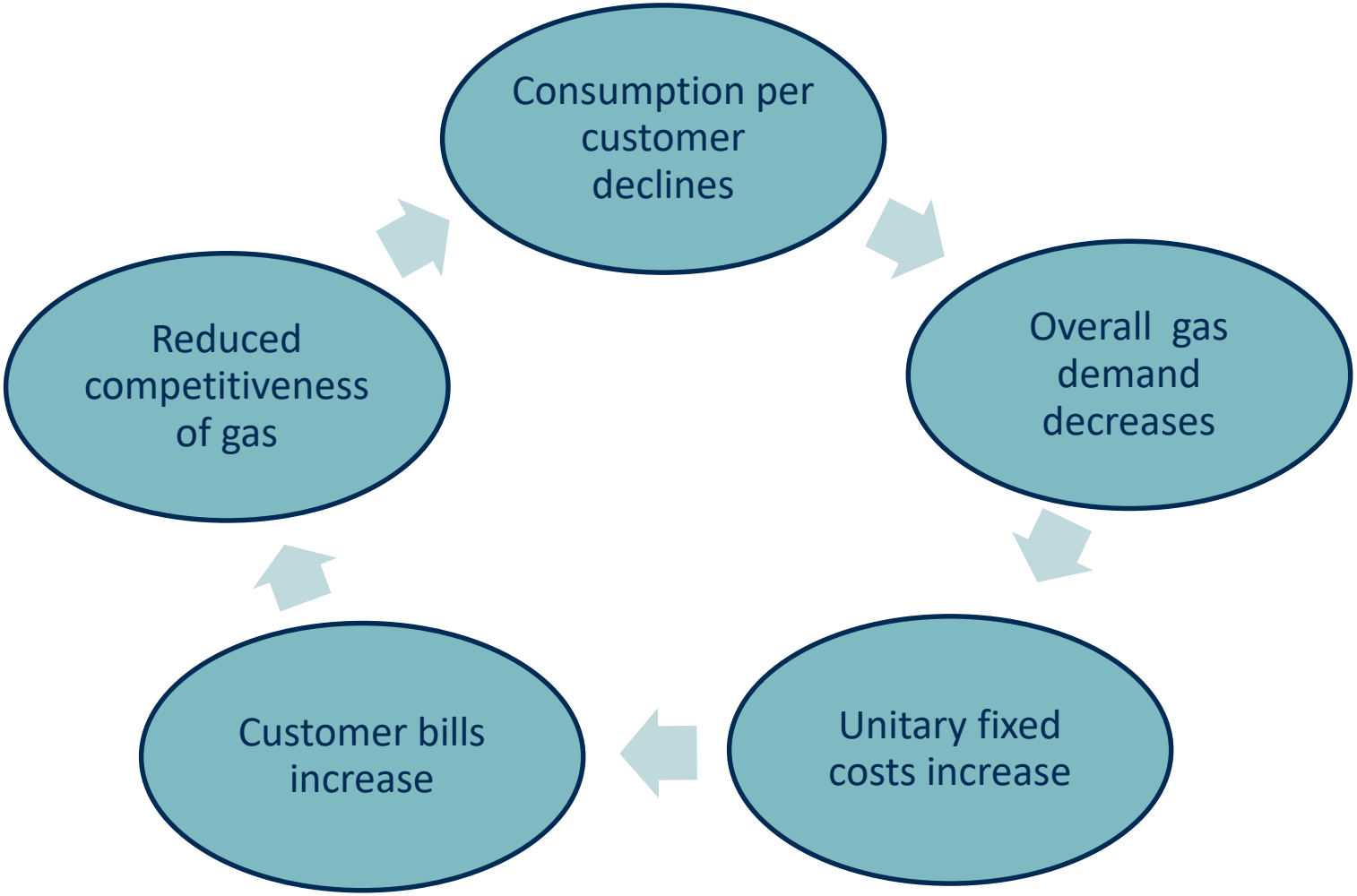
Source: British Gas Council advertisement from the 1950s

Yet use per customer is declining



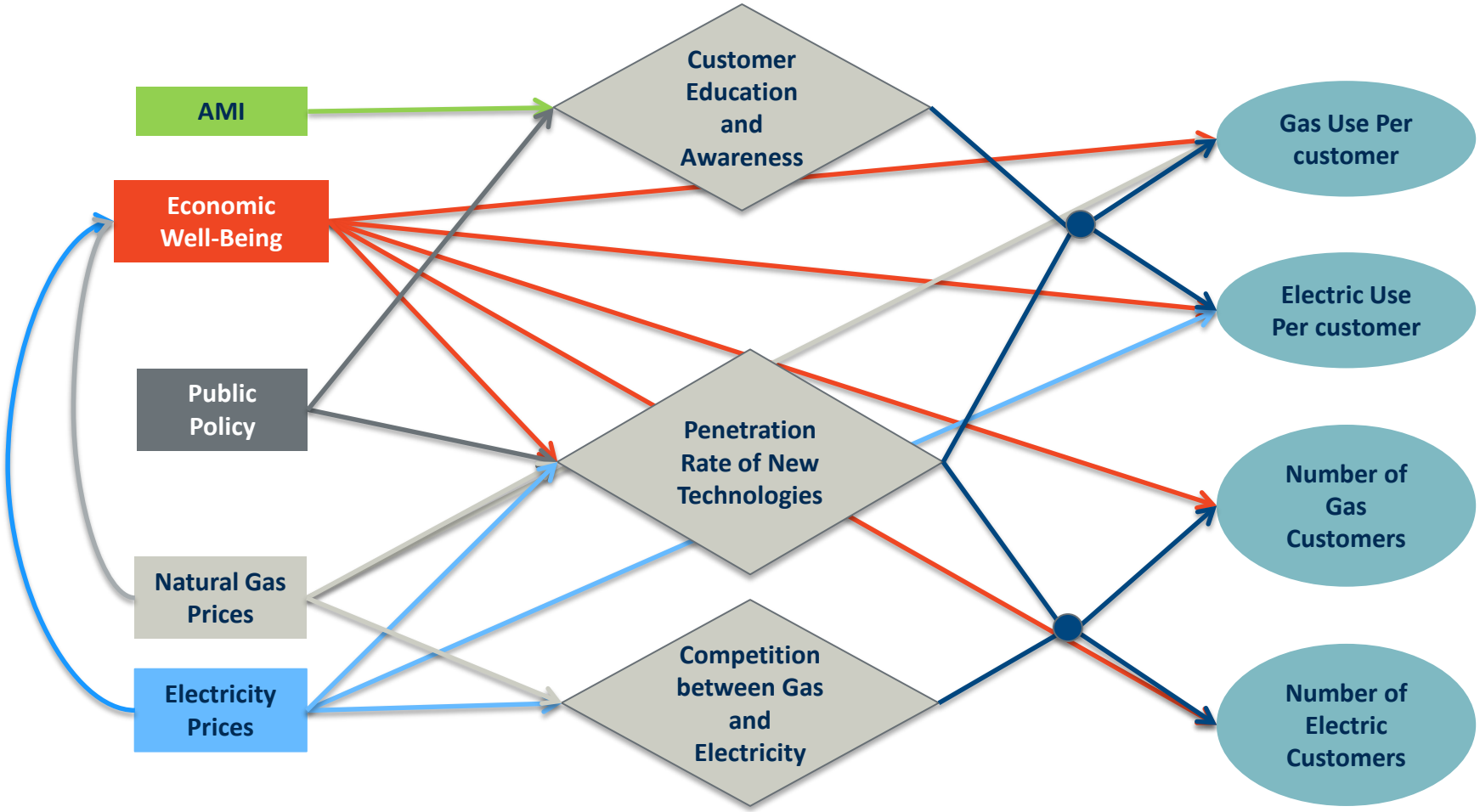
Source: American Gas Association, Table 6-13.

As consumption falls, unitary fixed cost increases, reducing gas competitiveness



There is a lot unknown about the future of the energy industry

Map of Drivers and Output Relationships



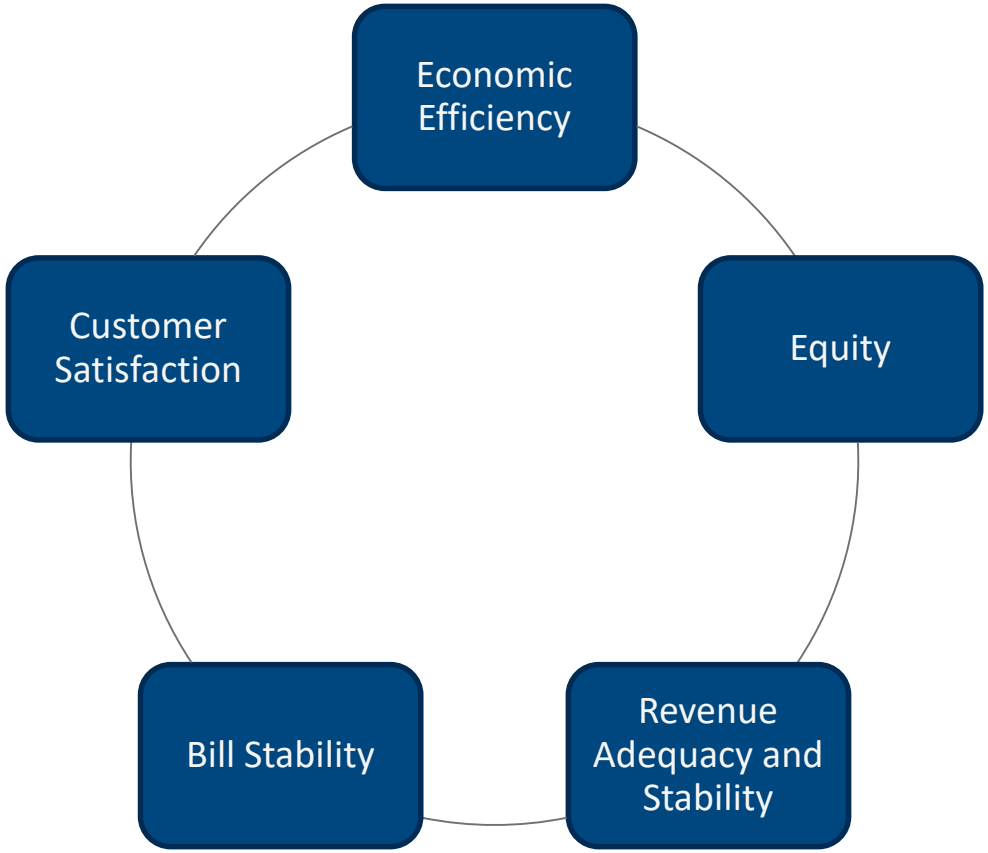
Across the globe, ELECTRIC utilities are experimenting innovative pricing options

Electricity Rate Design Mechanism	**Popularity**	**Requires Advanced Metering?**
Demand Charges	Widely used in C&I	Yes
Time-of-Use Charges	Widely used in C&I (sparingly in residential)	Yes
Peak-Shaving Rates	Widely used in C&I (sparingly in residential)	Yes
Higher Fixed Charge	Active proposals throughout US	No
Capacity Charge	Sporadically	Yes
Rates for New Technologies	Growing for both residential and C&I	Preferred

…similarly GAS utilities could offer innovative tariff design

Gas Rate Design Mechanism	**Popularity**	**Requires Advanced Metering?**
Demand Charges	Widely used in C&I	Yes
Time-of-Use Charges	None	Yes
Peak-Shaving Rates	Interruptible rates widely offered in large C&I	Yes
Higher Fixed Charge	Some proposals throughout US	No
Capacity Charge	Widely used in C&I	Yes
Rates for New Technologies	Slowly growing for both residential and C&I	Preferred

Pricing of the future will still consider the five core principles of rate design



Utilities are rethinking their tariff design

Recent developments on customers' consumption have motivated some utilities to examine their rates

- Refining customer class definitions to align with current consumption patterns, which can reduce unjustified cross-subsidies
- Pushing the adoption of emerging gas-fueled technologies with tailored rates or introducing new rates to increase utilization during off-peak season

Improved rate design can drive innovation in the industry, raise customer awareness and understanding of the natural gas network, and increase system load

Gas pricing innovations are still quite modest in comparison to electric pricing

Metering infrastructure for the gas and electric grid looks very different

- Almost half of all US households already have advanced electric meters
- Efforts to deploy gas AMI are still limited – most efforts are in conjunction with electric AMI

Gas has storage capability

- Value of flexibility is lower then for electricity

Electric consumer uses are much more diversified

- Gas is primarily used for space and water heating and cooking
- There is less leeway to "shift" consumption or adjust demand by turning off selected appliances

Nonetheless, some change is occurring in gas pricing

Redefining customer classes

Increasing fixed charges

Introducing the notion of demand subscription

Introducing capacity charges

Exploring rates for emerging technologies

Philadelphia Gas Works – Introducing rates for emerging uses and increased fixed charges

PGW made the strategic decision to support the development of specific natural gas uses, including:

- NGV refueling
- Gas Air Conditioning
- Cogeneration (C&I)

Separate rates with financial incentives – on the basis that marginal cost is lower than average costs – could impact the adoption of emerging gas uses

- Diversifying NG uses can help sustain system utilization

PGW was recently granted an increase in fixed charges for its standard Residential, Commercial, and Industrial rates for the first time in eight years

TOU pricing may induce peak-shaving behavior even among gas consumers

A study has been published that simulates the potential of gas TOU pricing for residential customers in Zhengzhou, China on peak-shaving

- Agent-based simulation was used to study the impact of TOU pricing with three time periods: peak, off-peak, and valley
- Key assumptions were made about the short-term price elasticity of gas demand

Main findings:

- Peak shaving efficiency increases as the proportion of consumption during peak hours increases
- The impact on low-income customer and high-income customer bills would be larger than for middle class customers
- Highlights the potential for significant gas operator benefits in a context of increasing demand

Several utilities have implemented opt-in rates for emerging gas uses

Utility	Off-peak Seasonal Rate for Gas AC	Off-peak Seasonal Rate	NGV Refueling Rate	Distributed Generation Rate	Other Emerging Technologies	LNG Rate
Atlanta Gas Light		•	•			
Atmos Energy	•					
Columbia Gas			•	•		
Con Edison	•	•	•	•		
LG&E			•	•		
National Fuel Gas			•	•		
National Grid NY			•			
Nicor Gas		•				
NIPSCO		•				•
NYSEG	•		•	•		
People's Gas			•			
PG&E			•			
Philadelphia Gas Works	•		•			•
RG&E				•		
SDG&E			•			
SoCalGas	•		•		•	
Virginia Natural Gas	•		•			
Yankee Gas		•	•			

Moving ahead with tariff reform (I)

Understand how customer bills will change if the new rates are implemented immediately

- Identify how much bills will rise for small users
- Find ways to mitigate these bill impacts

Simulate the impact of the rates to study the likely customer response

- Models, such as PRISM, are available for carrying out such simulations

Engage in a customer outreach program to explain why tariffs are being changed

- Make sure the new rates use clear and understandable language
- Enlist neutral parties to endorse the change
- Use social media to spread the word

Moving ahead with tariff reform (II)

Change the rates gradually over a three-to-five year period or provide bill protection that is gradually phased out

For the first few years, make the rates optional for low income, small users and disabled customers

- Or provide financial assistance for a limited period of time

Consider a subscription concept in which customers "buy" their historical usage and the historical price and buy or sell deviations from that usage at the new tariffs (transactive energy)

Conduct pilots to test customer acceptance and load response to the new rates

There is a lack of innovation in gas utility tariff design

Storage capabilities on the gas distribution system implies no real time constraint or necessity for time-varying pricing – however, several opportunities still exist to improve gas distribution pricing

Utilities must adapt to changing consumption patterns and competition with electrification

- Increased alignment between distribution cost structure and customer charges to improve revenue recovery
- Closer examination of customer class definition and seasonal pricing to improve economic efficiency
- Introduction of rates for emerging technologies to diversify customer gas uses

Implementation of these practices will help gas utilities adapt to future changes in customer preferences and consumption patterns

Several questions must be answered before moving ahead with tariff reform

What types of new rates should be considered ?

How will customer bills change with the implementation of these new rates?

What will be the customer response to these new rates?

What type of customer outreach programs will be necessary?

Over what period should rates be changed or bill protection be provided to ease the transition?

Should the rates optional for certain customers? For how long?

How should a pilot be designed in order to test customer acceptance and load response to the new rates?

Presenter Information

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Léa Grausz is an associate in The Brattle Group's San Francisco office. Ms. Grausz has experience in dispute resolution and regulatory proceedings in energy markets, including: upstream natural gas long-term contracting and pricing; gas pipeline ratemaking; liquidity assessment in global oil and gas markets; tariff design for electricity and natural gas; incentive regulation for electric and gas utilities; and assessment of the impact of demand-side management programs.

Prior to joining The Brattle Group, Ms. Grausz worked for four years for Engie in Paris, France where she performed economic analysis for price negotiations and contract arbitrations for long-term gas supply contracts.

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