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# *Energy Transformation - the Road Ahead for Utilities*

&

*Ontario Energy Association -  
Speaker Series*

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# *Today's Discussion*

## Topics

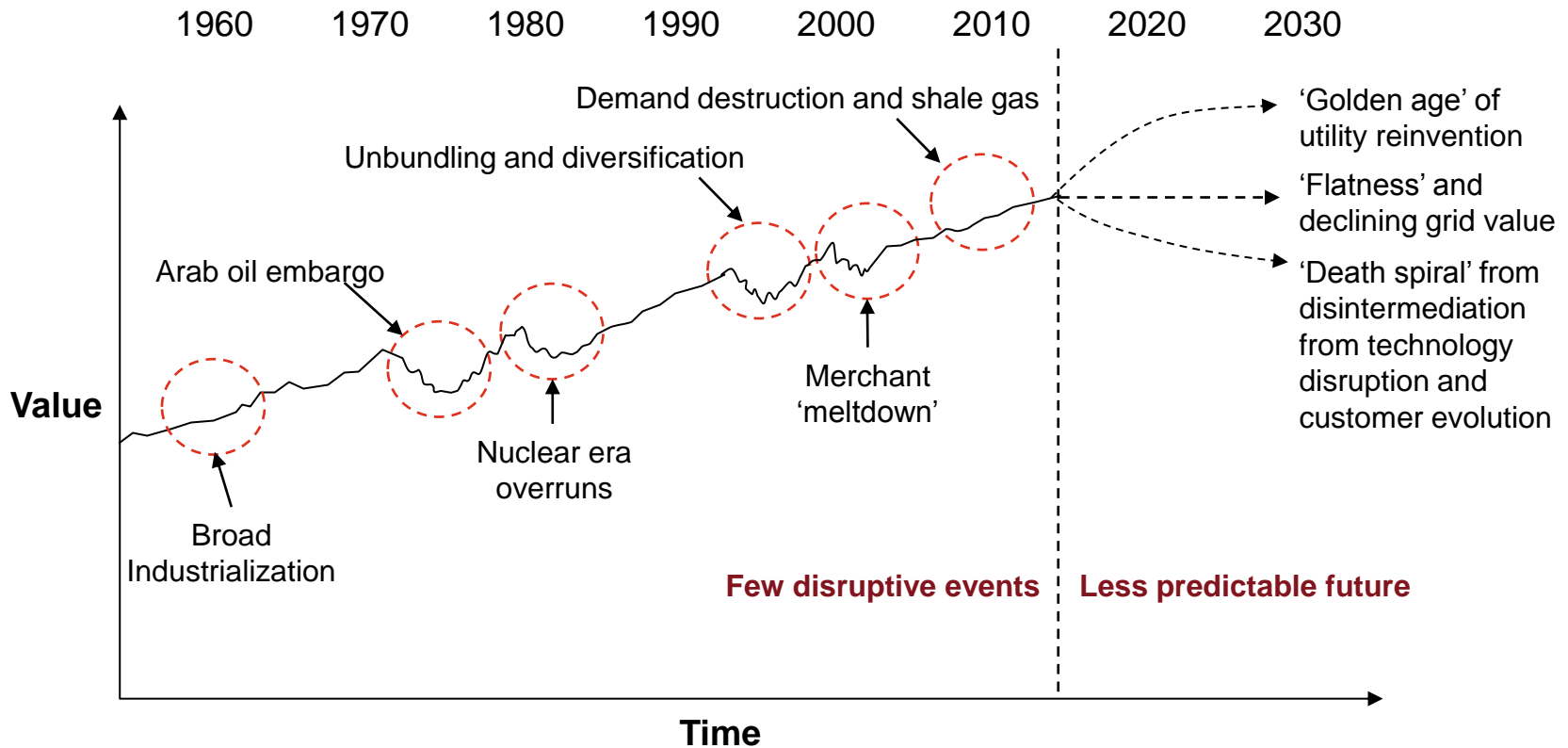
- 1 **Trends in Industry Structure**
- Major drivers for evolution and potential implications

- 2 **Planning Under Uncertainty**
- Complexities in understanding and forecasting an imperfect future

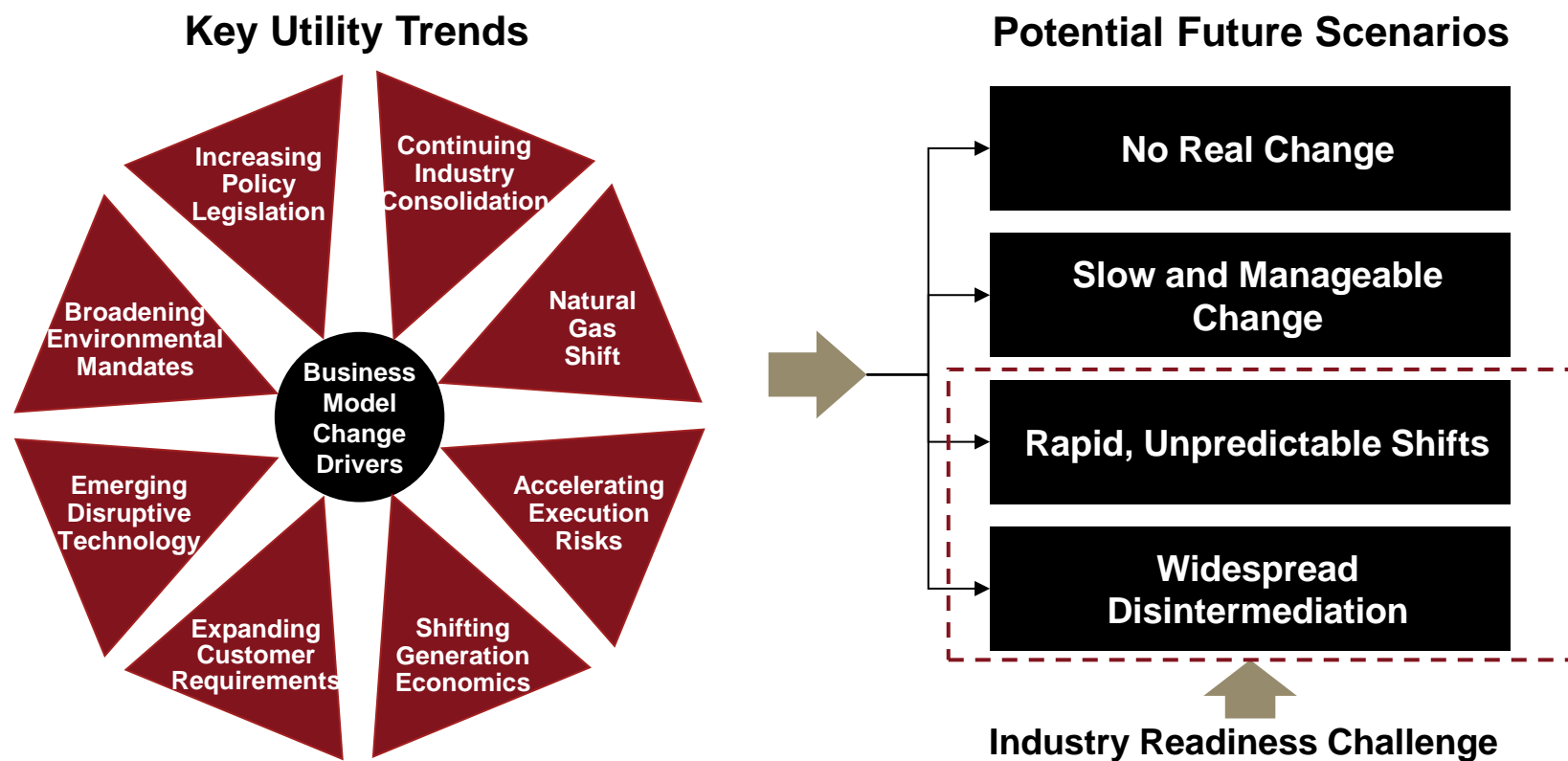
- 3 **The Emerging Customer**
- Shifting customer preferences and future market requirements

- 4 **Business Model Realignment**
- Potential growth options for the incumbent utility industry

# *The utility sector is at a new inflection point in its evolution, reflecting technology and demographic changes*

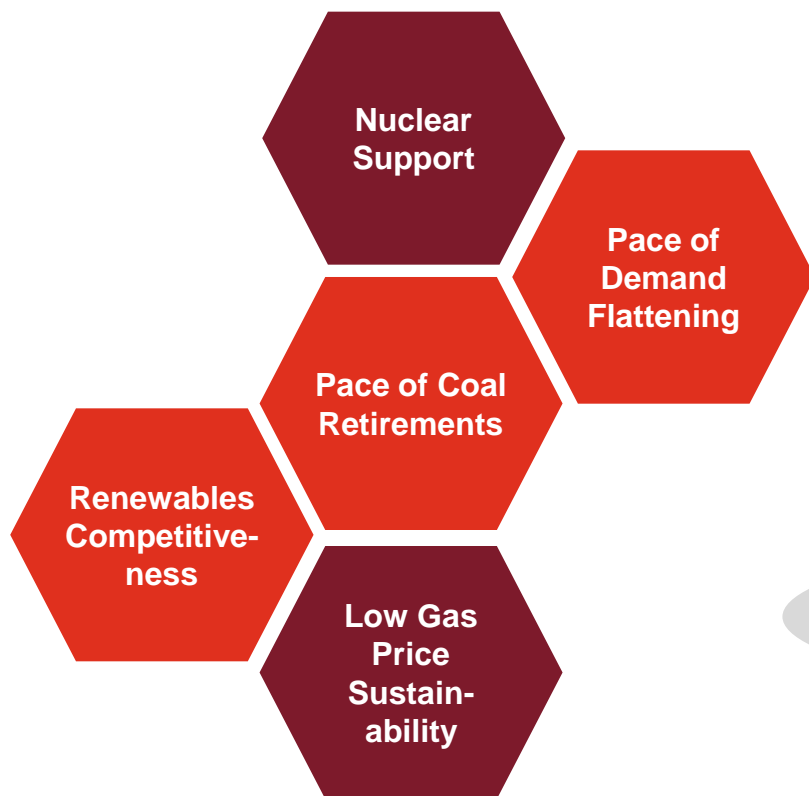


# *Moreover, utilities face an array of external challenges which impact future business planning*

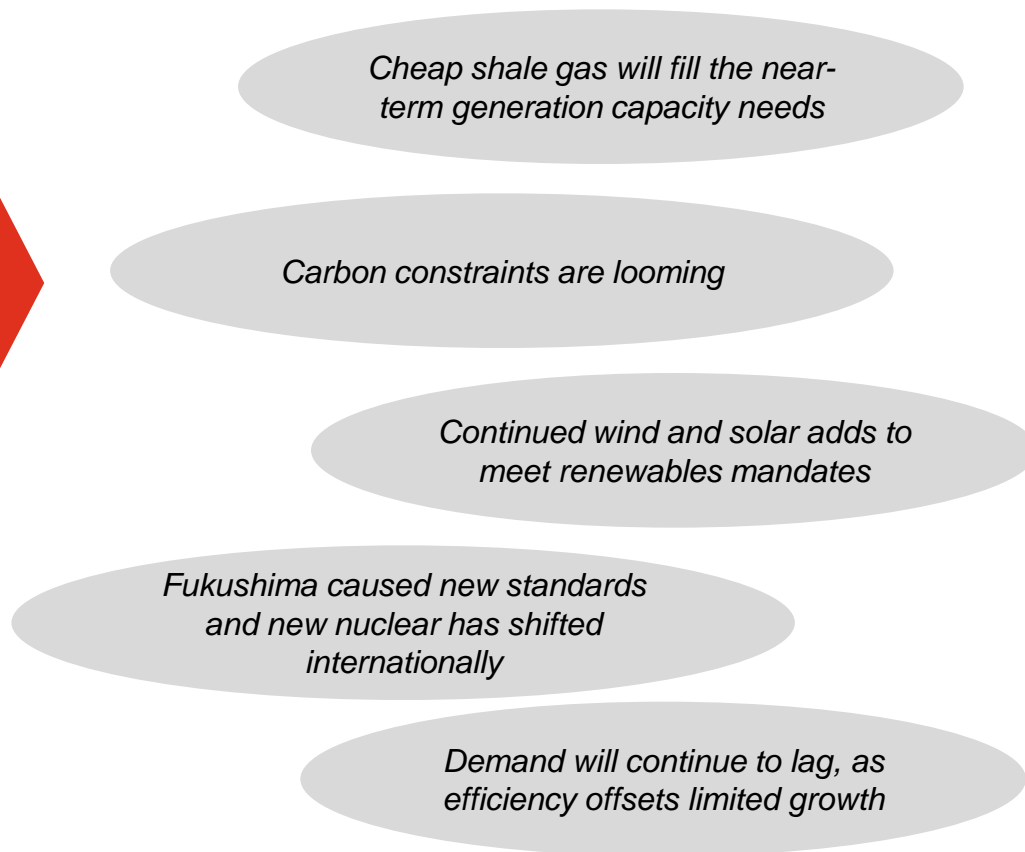


# *Utilities are planning their future business amidst significant forecasting uncertainty*

## Current Market Uncertainty Drivers



## Current Reaction / Consensus



# *The industry's ability to forecast has been poor and overly weighted toward the status quo and 'group think'*

## Power and Gas Market Forecast Evolution

EIA Annual Energy Outlook

### U.S. Gas Prices<sup>1</sup>

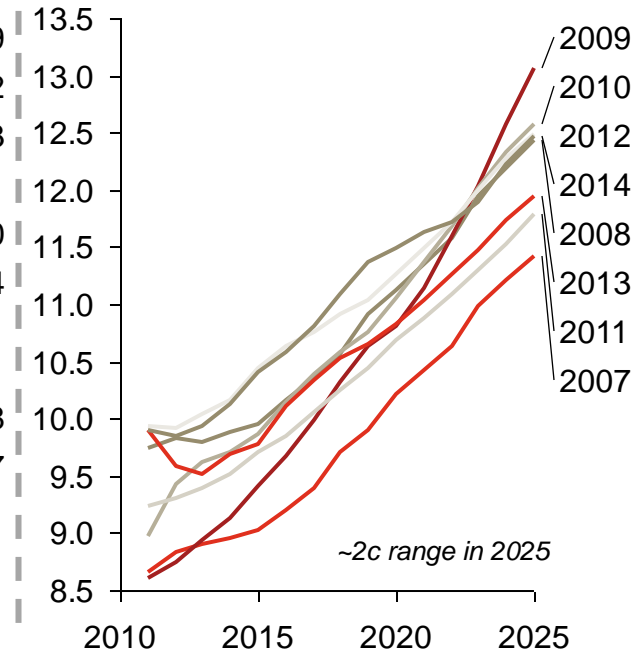
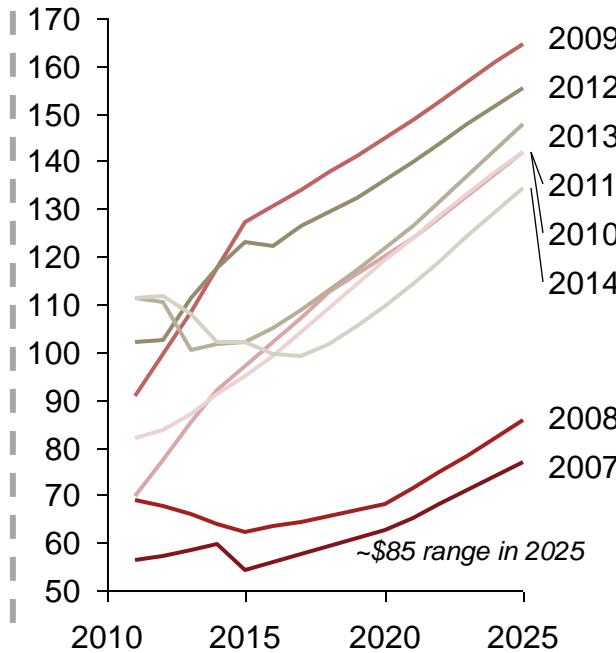
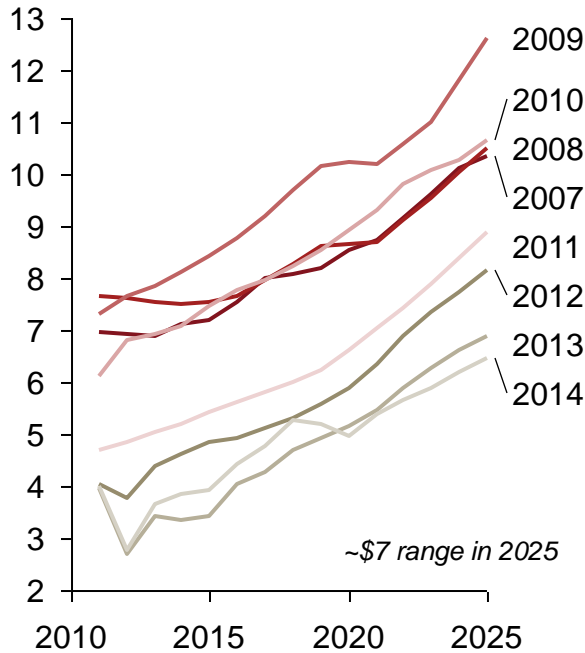
### Global Oil Prices<sup>2</sup>

### U.S. Electricity Prices<sup>3</sup>

USD/mmbtu

USD / Barrel

c / Kwh



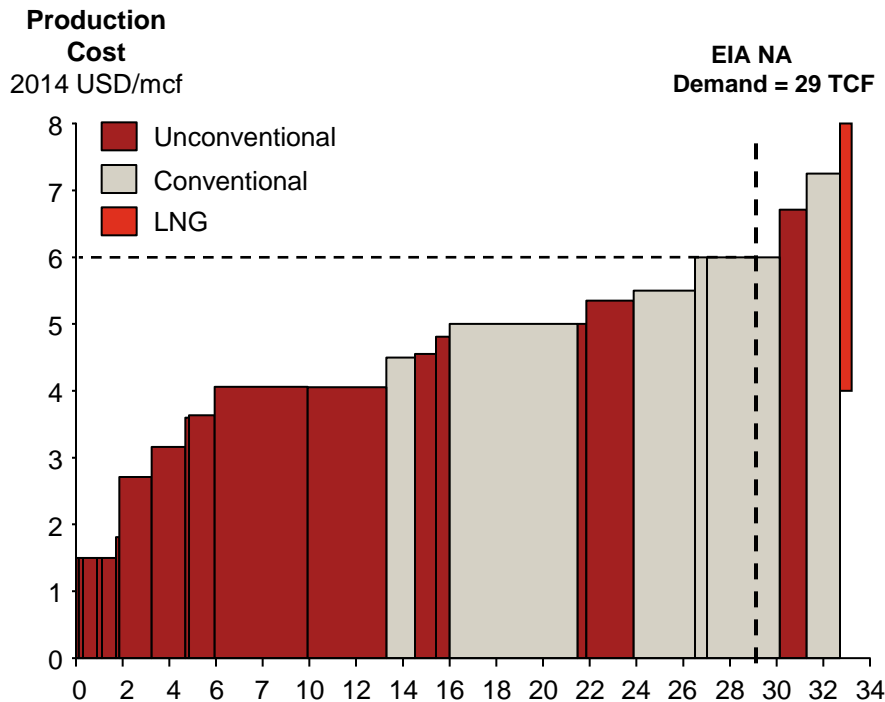
Note; All Prices are in nominal dollars

1) Henry Hub spot; 2) Brent spot; imported crude oil for pre-2013 forecasts; 3) Average end user prices

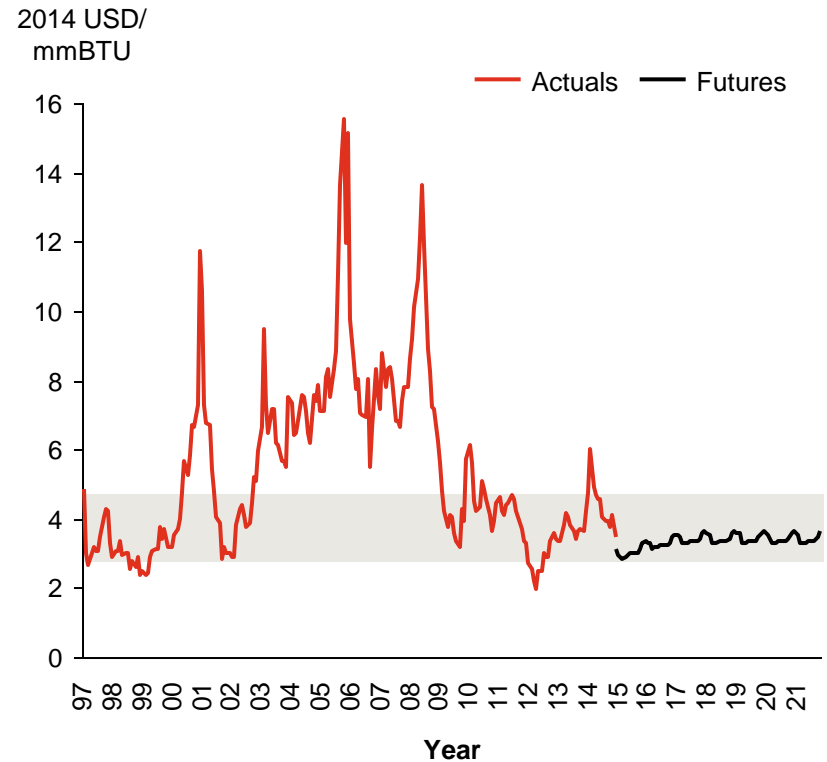
Source: EIA Annual Energy Outlooks, 2007 - 2014

# *Futures markets have gas prices to current lows, but supply dynamics suggest USD\$5-6/mmbtu is a more likely range ...*

**North American Gas Supply Curve<sup>1</sup>**  
2020



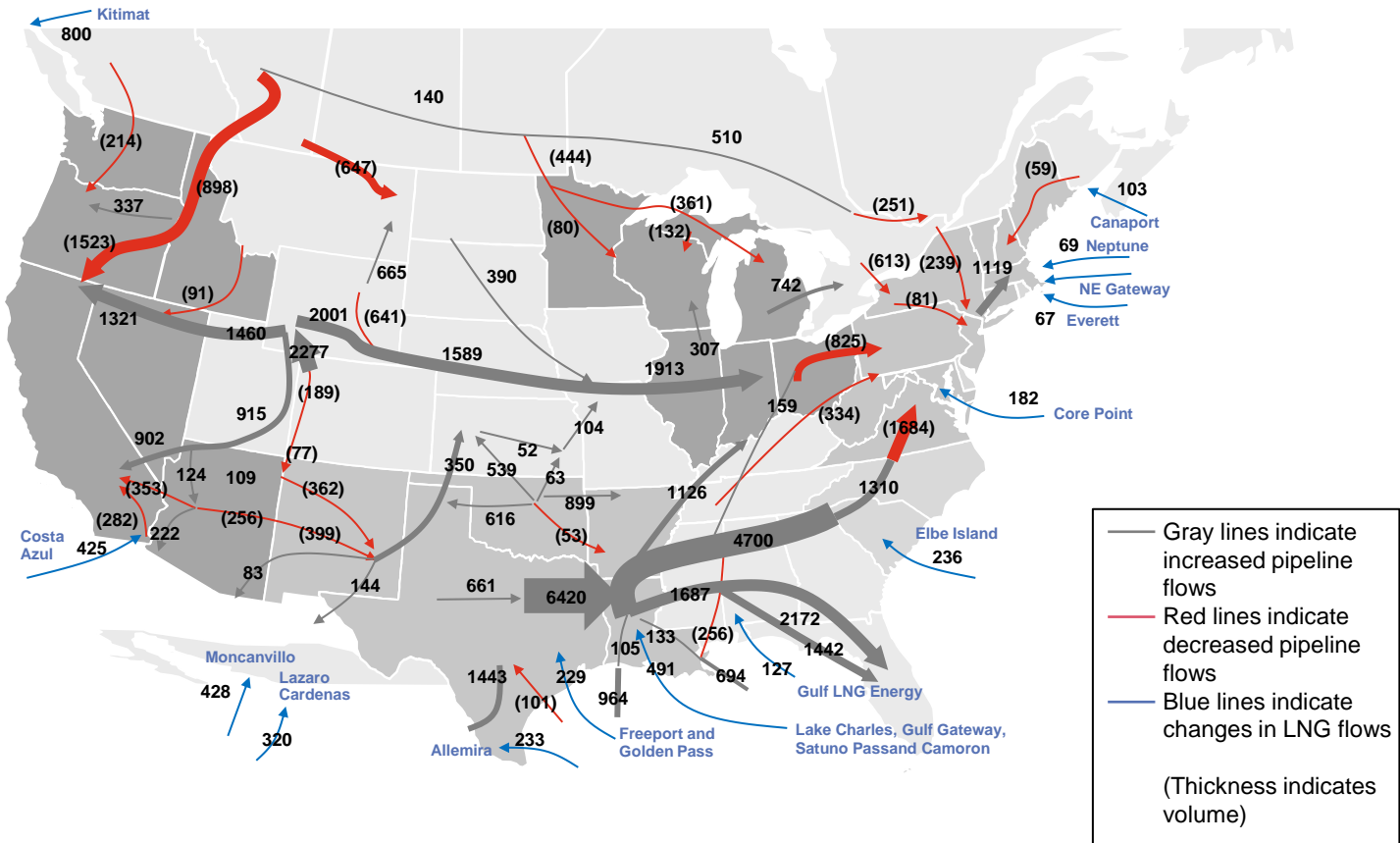
**Natural Gas Prices**  
Henry Hub, historical and futures



1) Estimated Henry Hub price necessary to realize 10% IRR; data is representative of breakeven prices for a sample of companies from each location; assumes \$90 WTI oil price  
Sources: BP Energy Outlook 2030, EIA, Credit Suisse, Goldman Sachs, INGAA, Company Reports, CERA, Client Interviews, Hart Energy, EIA, SNL, Strategy& analysis

# ... however accessing these sources of low-cost shale gas creates changes to natural gas pipeline flows

Inter-Regional Natural Gas Pipeline Flows (Change from 2010 to 2035 in MMcfd)



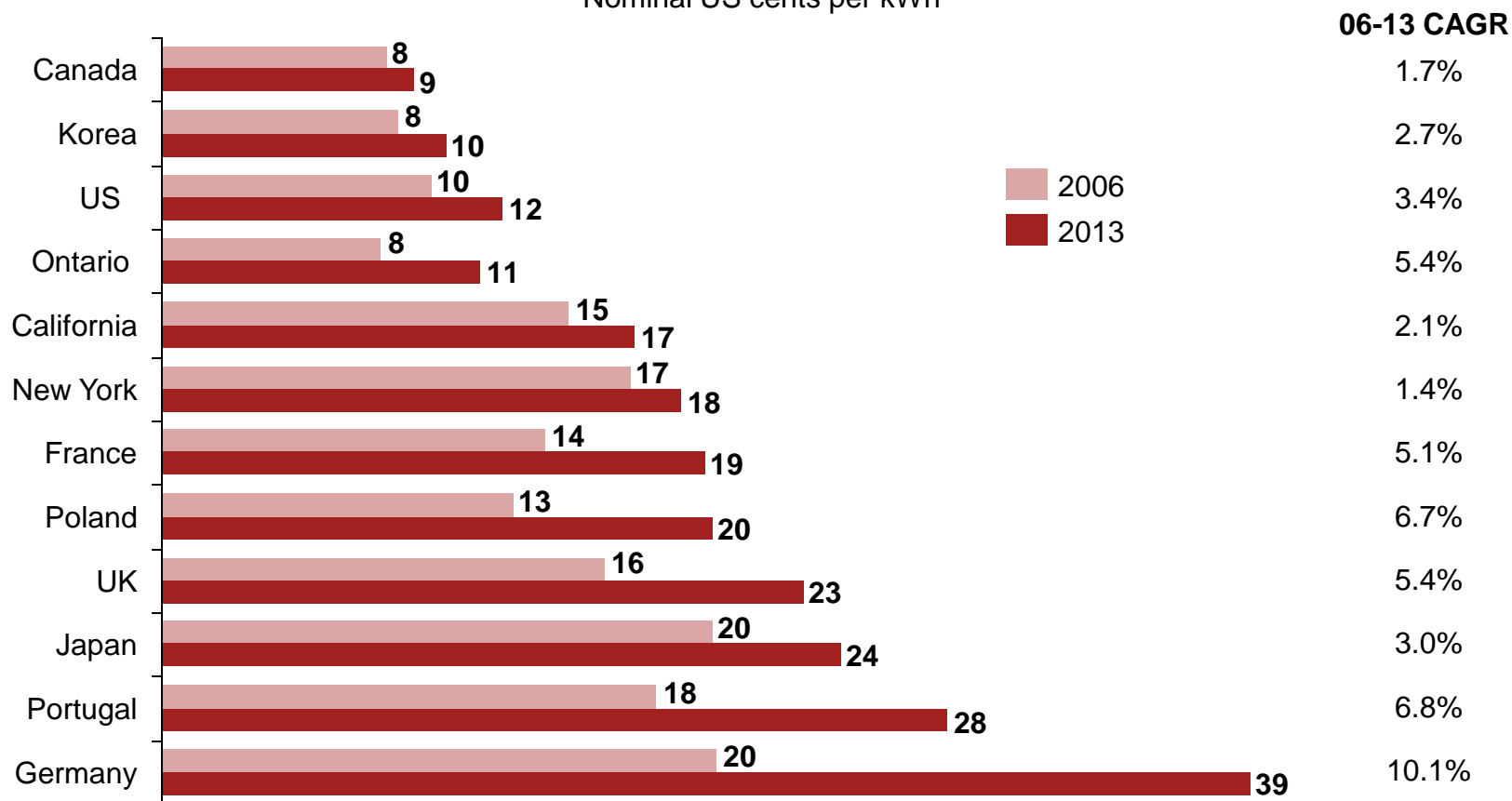
Note: This map does not show generally intra-regional pipeline expansions such as those that occur within the Marcellus shale production area  
 Source: ICF International



# Global electricity price levels reflect a wide disparity in fundamental dynamics ...

## Residential Electricity Rates

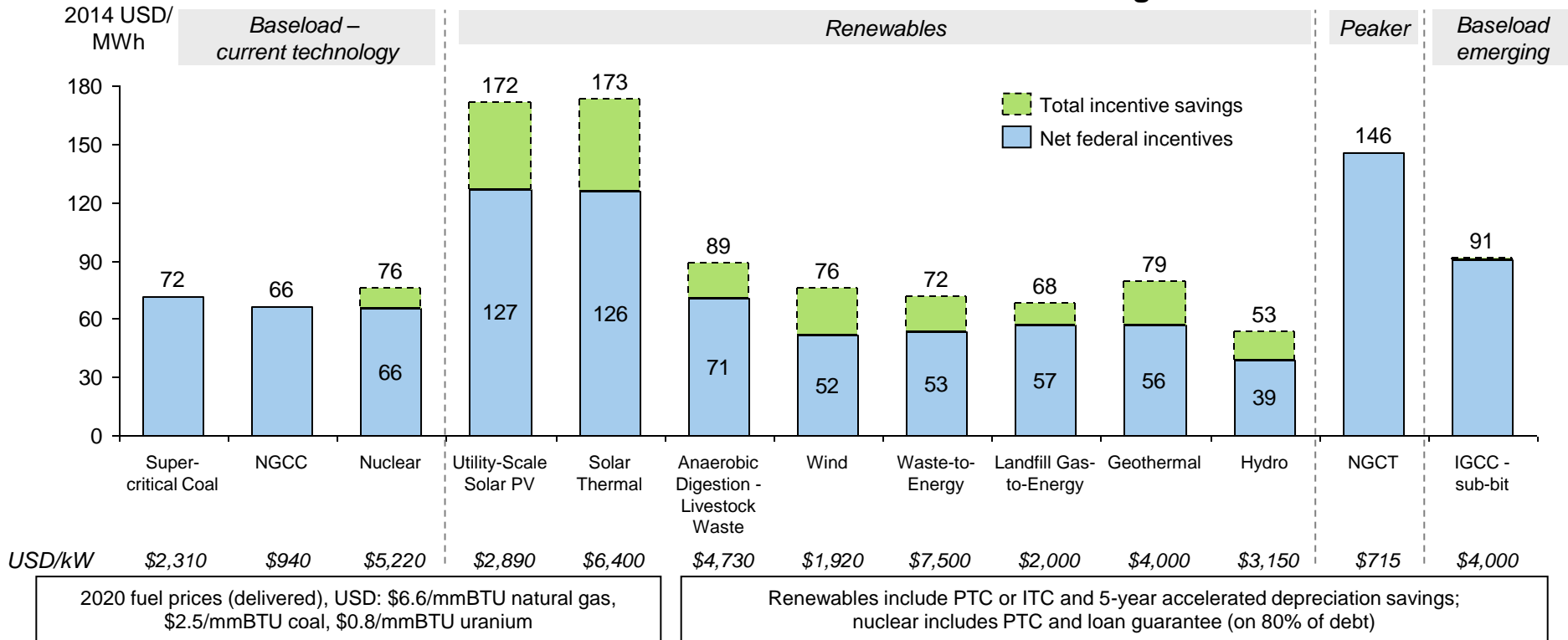
Nominal US cents per kWh



Sources: IEA, EIA, CEA

**... and despite falling costs, most renewables are at a premium relative to baseloads and thus contribute to higher prices**

**Indicative Levelized Costs of Generation Technologies**

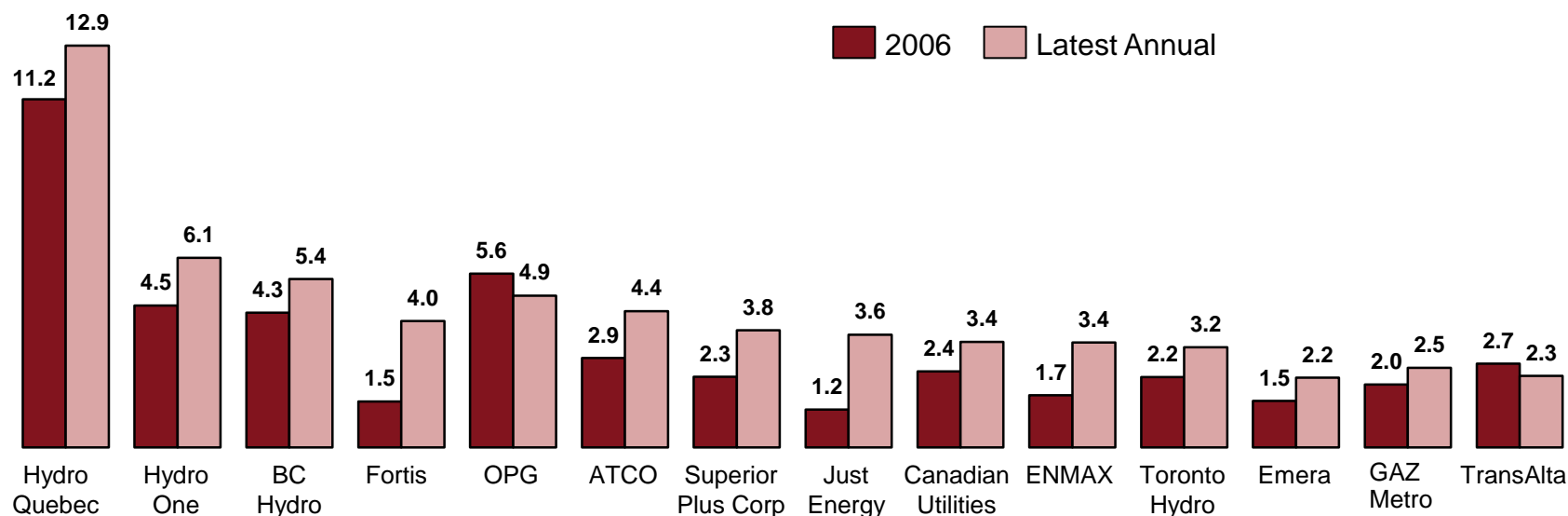


*Note: 8% nominal (5.5% real) WACC except nuclear (7% nominal to reflect loan guarantee), 2.5% inflation rate; taxes excluded; capital includes interest payments (55% debt-capital and 7% cost of debt), ITC savings, and depreciation tax shield savings; O&M includes PTC savings; emissions include \$25/ton CO2 starting in 2025; renewables exclude backup power; \$6.6/mmbtu natural gas reflects Henry Hub plus 20% transportation adder; taxes excluded; nuclear includes fuel disposal, site decommissioning, and maintenance capex spend*  
*Sources: Multiple industry reports including EIA, SNL, NREL, LBNL, and OpenEnergy; confidential project database; Booz & Company analysis*

# Canadian utilities – most notably the 14 largest – have shown steady growth since 2006...

## Top 14 Canadian Utilities by Revenue

C\$ Billions, 2006 to Current

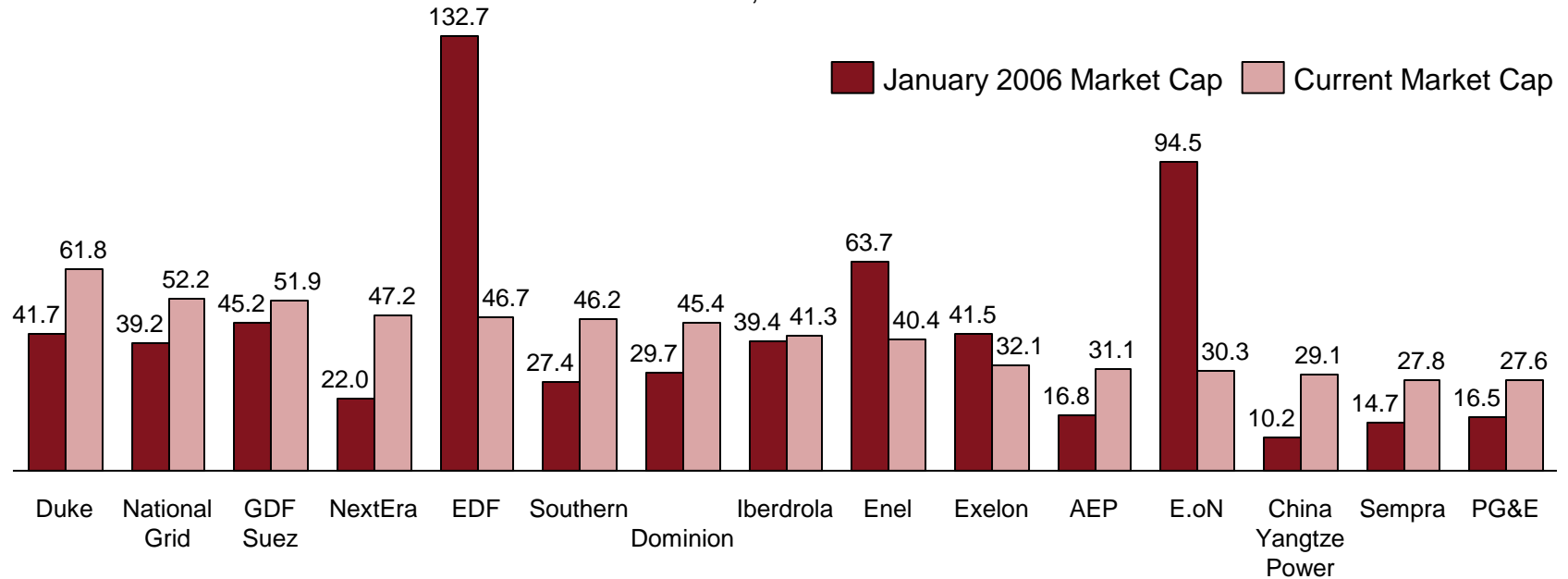


	2006 (C\$ B)	Current (C\$ B)	Gain (C\$ B)	Annual Growth 06-14
<b>Top 14 Utilities Revenue</b>	45.9	62.0	16.10	3.5%
<b>Total Canadian Utilities Revenue</b>	77.7	79.7	1.997	2.57%

Sources: Annual revenue (Company Filings), IBIS Canada Reports (We have added revenues of the Canadian Electricity and the Canadian Gas Distribution firms)

*... while the composition of the largest global utilities has markedly shifted in the last 10 years*

**Top 15 Utilities by Market Cap**  
Global billion USD, 2015 relative to 2006<sup>1</sup>



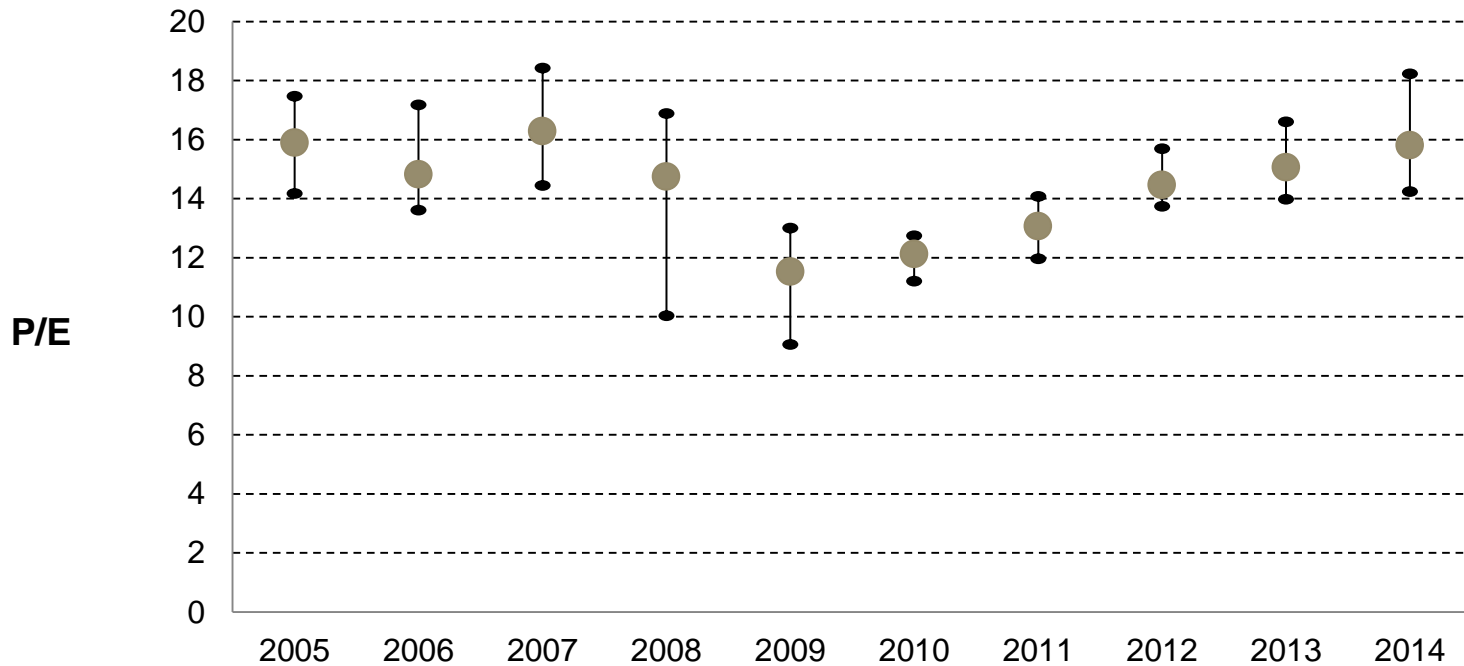
	2006	Current <sup>(1)</sup>	Delta	% Change
<b>Top 15 Utilities Market Cap , USD</b>	\$635B	\$611B	-\$24B	-3.7%
<b>Global Total Utilities Market Cap, USD</b>	\$2,452B	\$2,447B	-\$5B	<-1%

1) Market cap as of 16 January 2015  
Source: Bloomberg

***US utility P/Es have steadily returned to pre-recession levels, while variability is also increasing...***

**S&P Electric Utility Index P/E Ratios**

Forward P/Es

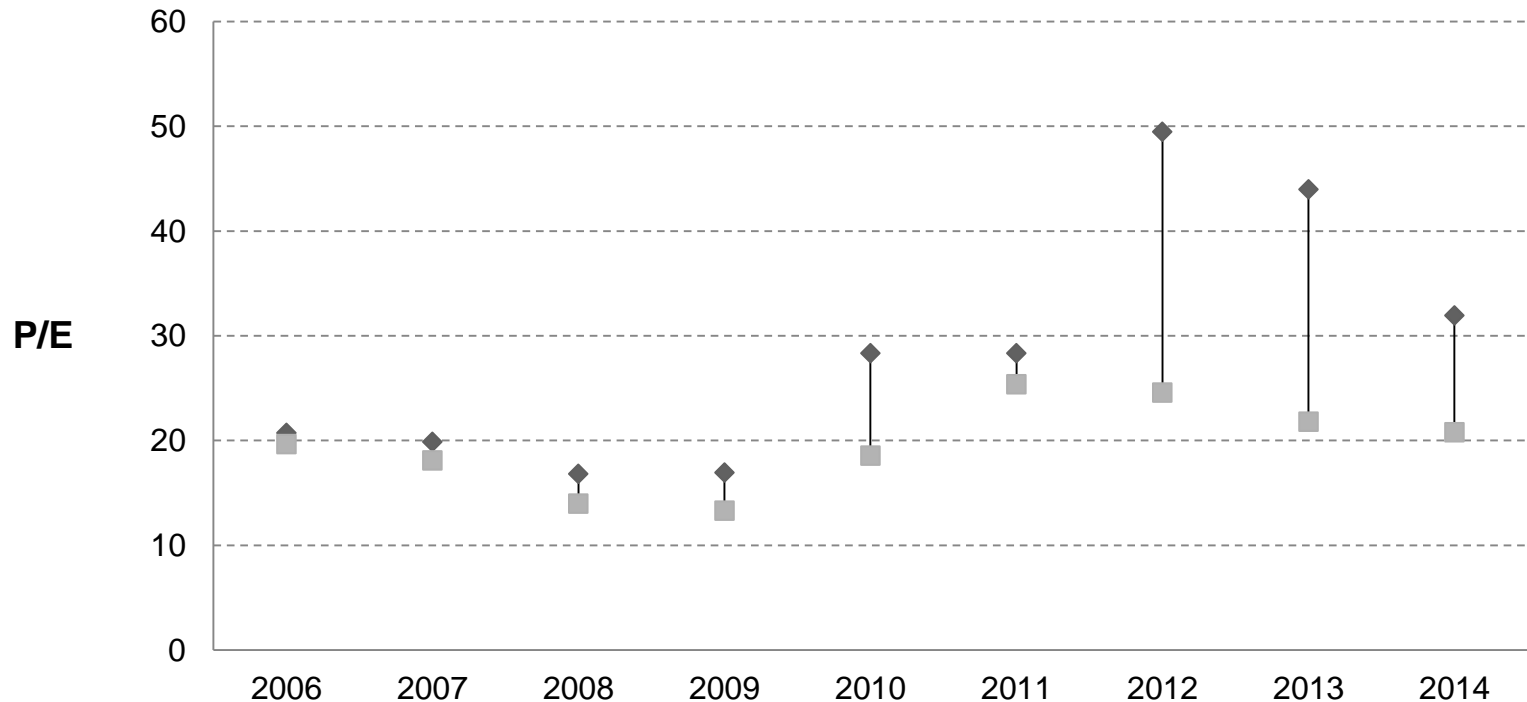


<b>Standard Deviation</b>	0.7	1.0	1.0	1.7	0.8	0.3	0.4	0.5	0.5	0.8
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Source: Bloomberg - S&P 500 Electric Utilities Industry Index GICS Level 3

***... while Canadian utility P/Es are higher and more variable than pre-recession levels***

**Toronto Stock Exchange Composite Utilities Sector Index**  
Forward P/Es

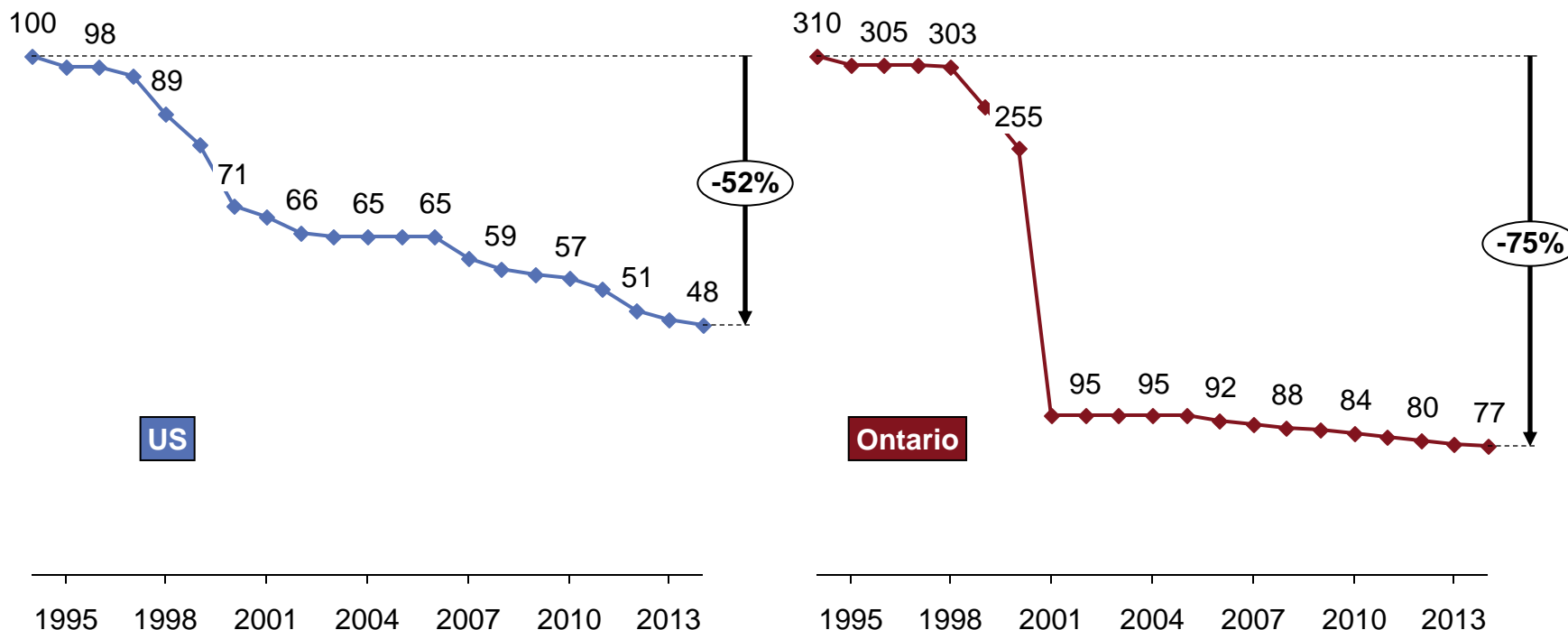


Source: Bloomberg - S&P/TSX Composite Utilities Sector Index GICS Level 1

# As consolidation discussion continues, both US and Canada utilities have steadily been realigning for the last 20 years ...

## Number of Publicly-Traded / Government-Owned Electric Utilities<sup>(1)</sup>

Parents only, 1994-2014

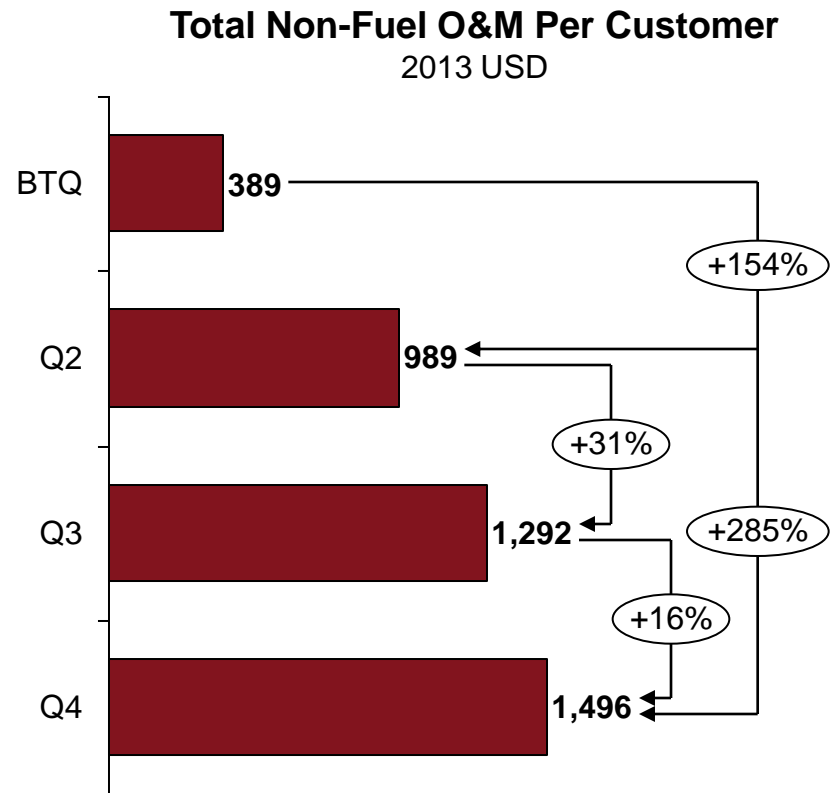
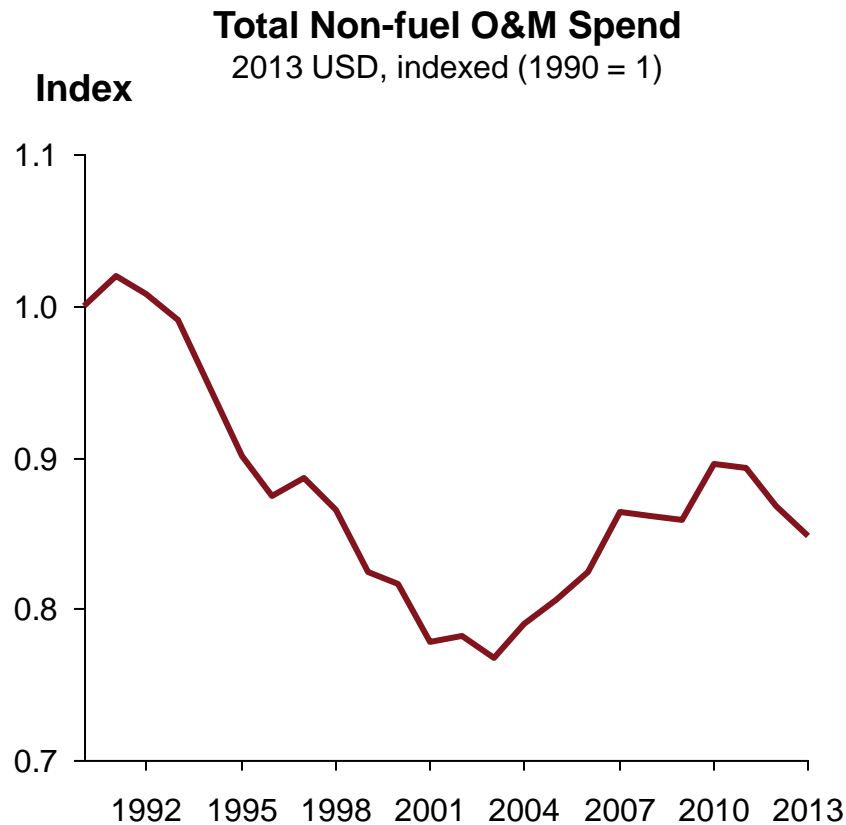


\* As of June 30, 2014; adjusted for the closing of the Fortis acquisition of UNS Energy Corporation in August 2014

1) Members of the EEI Index; includes parent companies only

Source: EEI, EDA

***... which has driven operating efficiency in the US, though wide disparity exists in absolute and relative cost position ...***

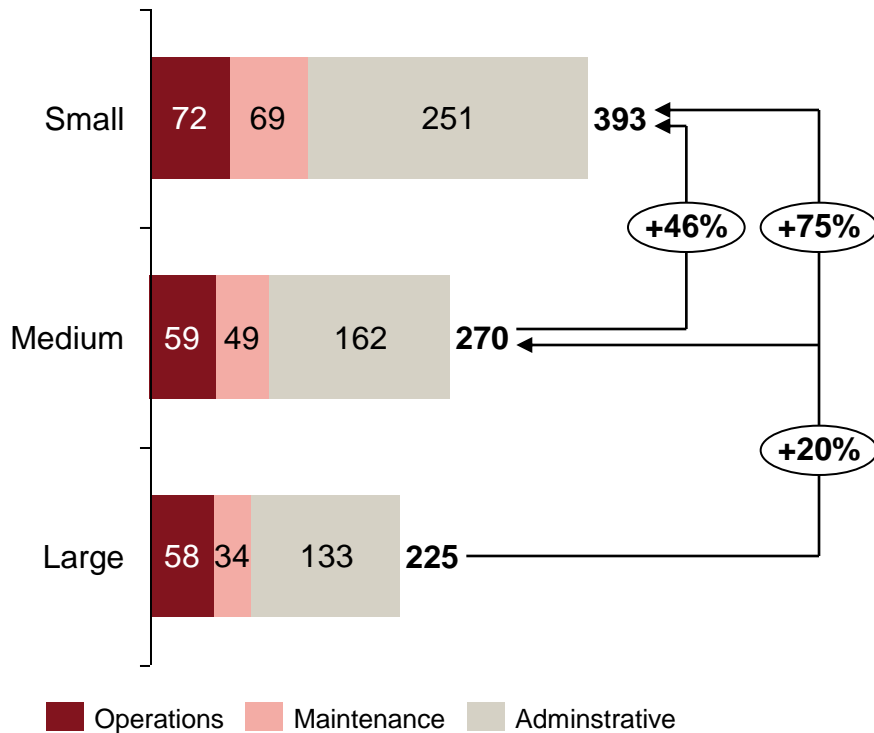


*Note: Assumed inflation rate of 2.5% per year; company set includes only companies with reported O&M data for all years with extreme outliers excluded*  
Sources: SNL, Strategy& analysis, 54 utilities

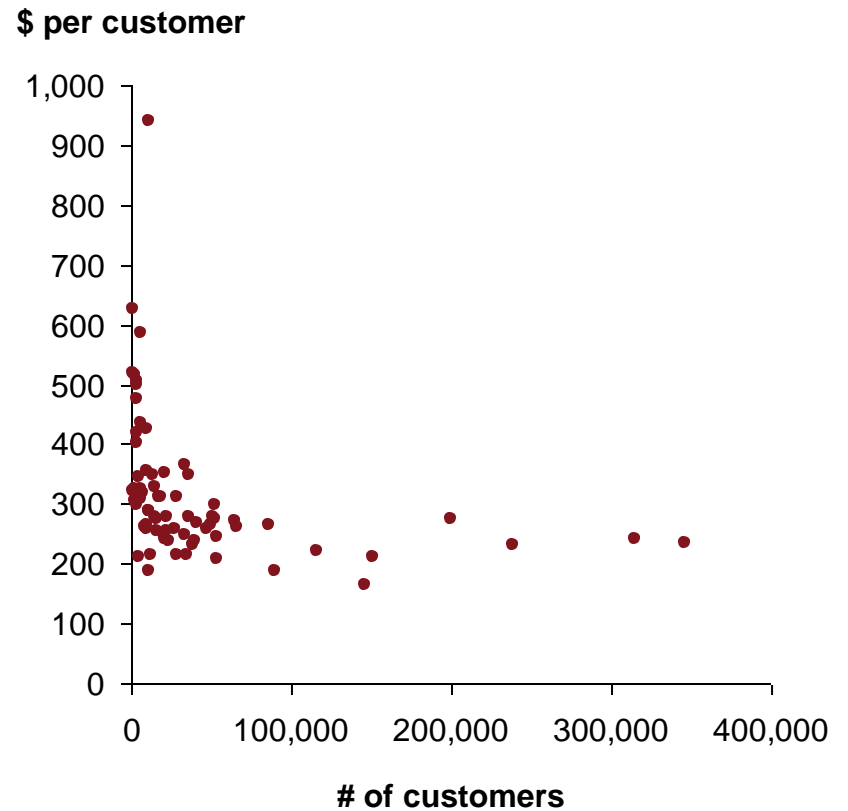


# ... and the cost profile for Ontario LDCs varies notably by size

**LDC OM&A Costs Per Customer**  
2013 CAD per customer



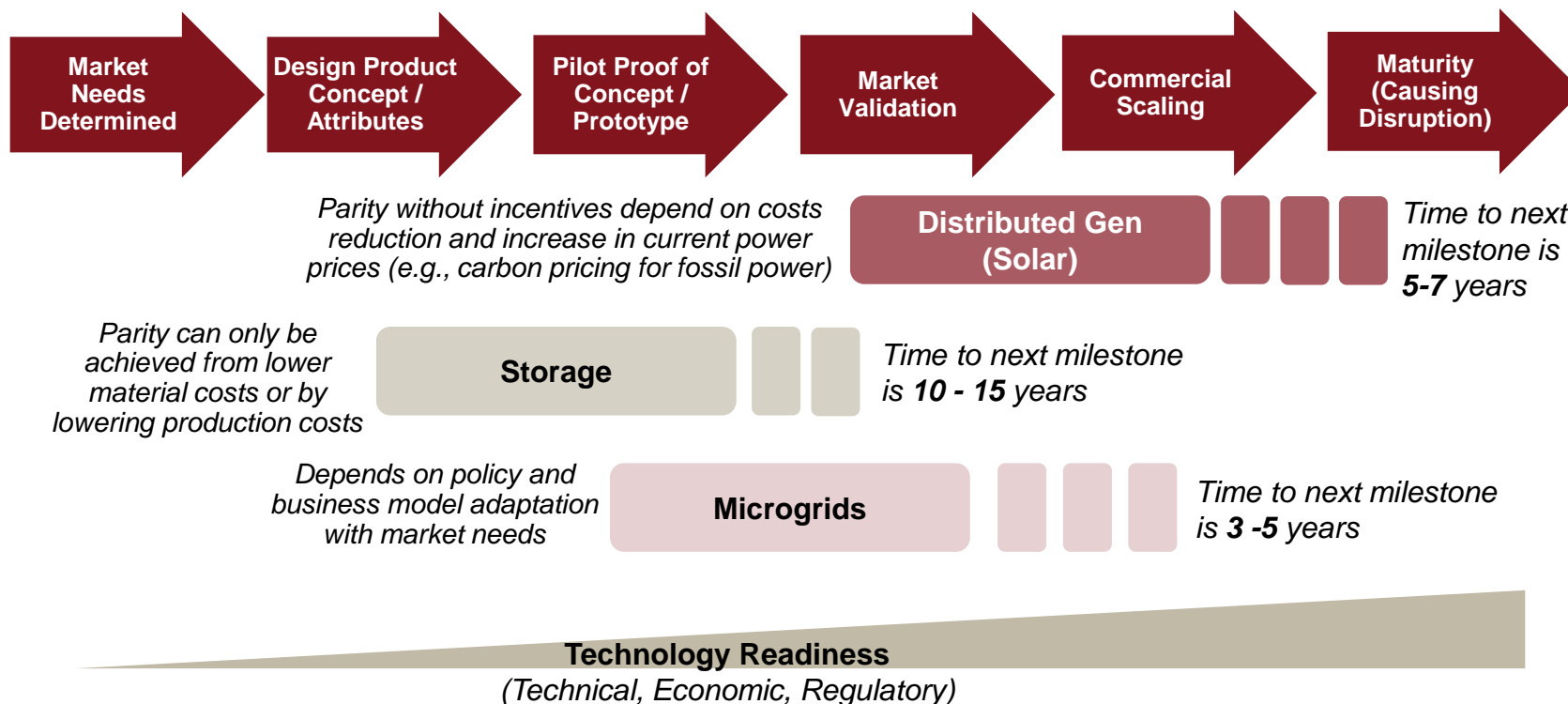
**OM&A Costs per Customer by LDC Size -**  
2013 CAD



Source: Ontario Energy Board, 2013 Yearbook of Electricity Distributors Data

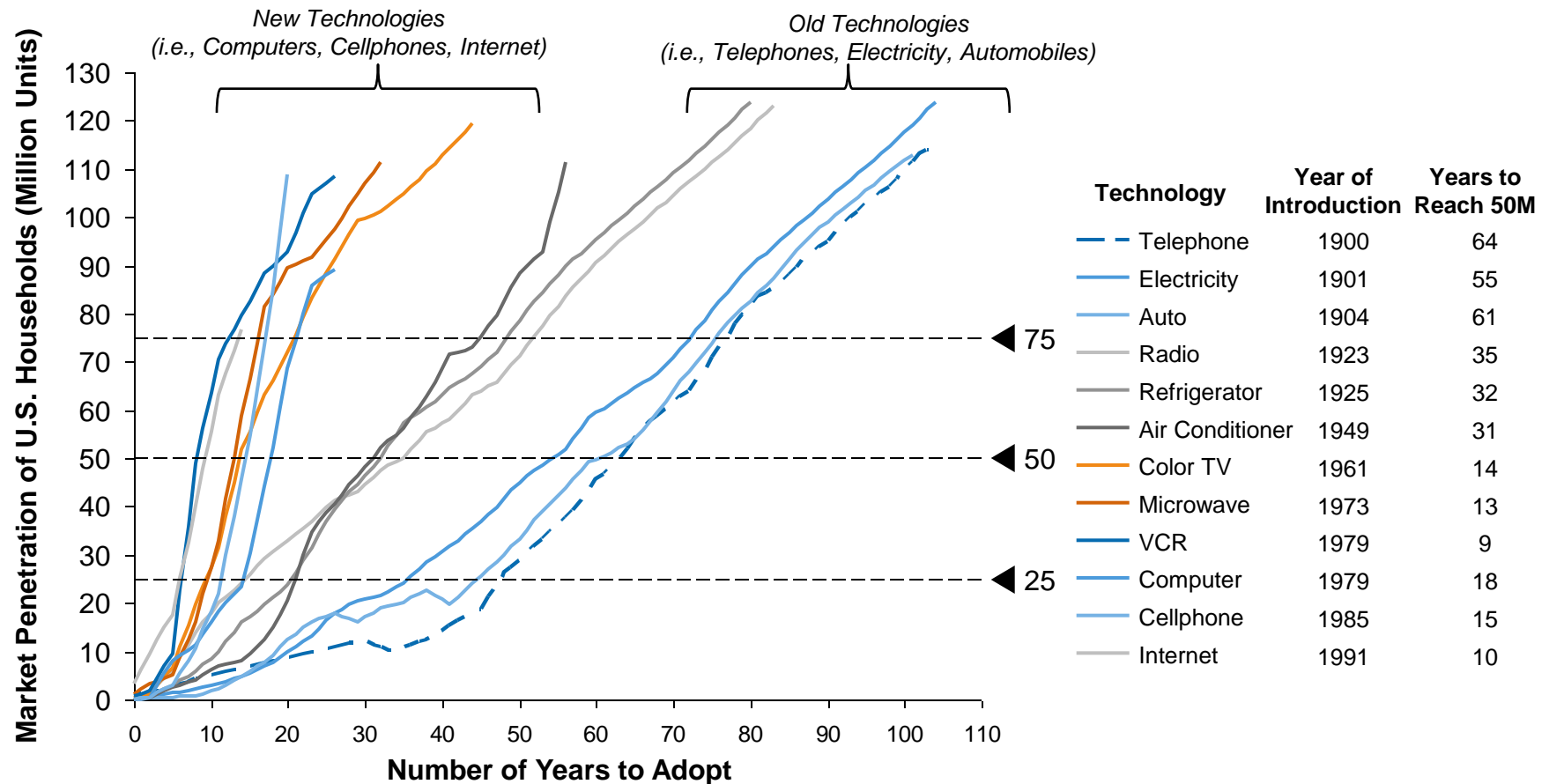
# Potential 'game changing' technologies such as storage or micro-grids are likely to take a few more years to mature ...

## Key Technology Adoption and Maturity Cycle Milestones



Sources: Multiple sources – US DOE, State PUCs, Media Releases

*... although technology adoption rates in recent years have accelerated for newer technologies*

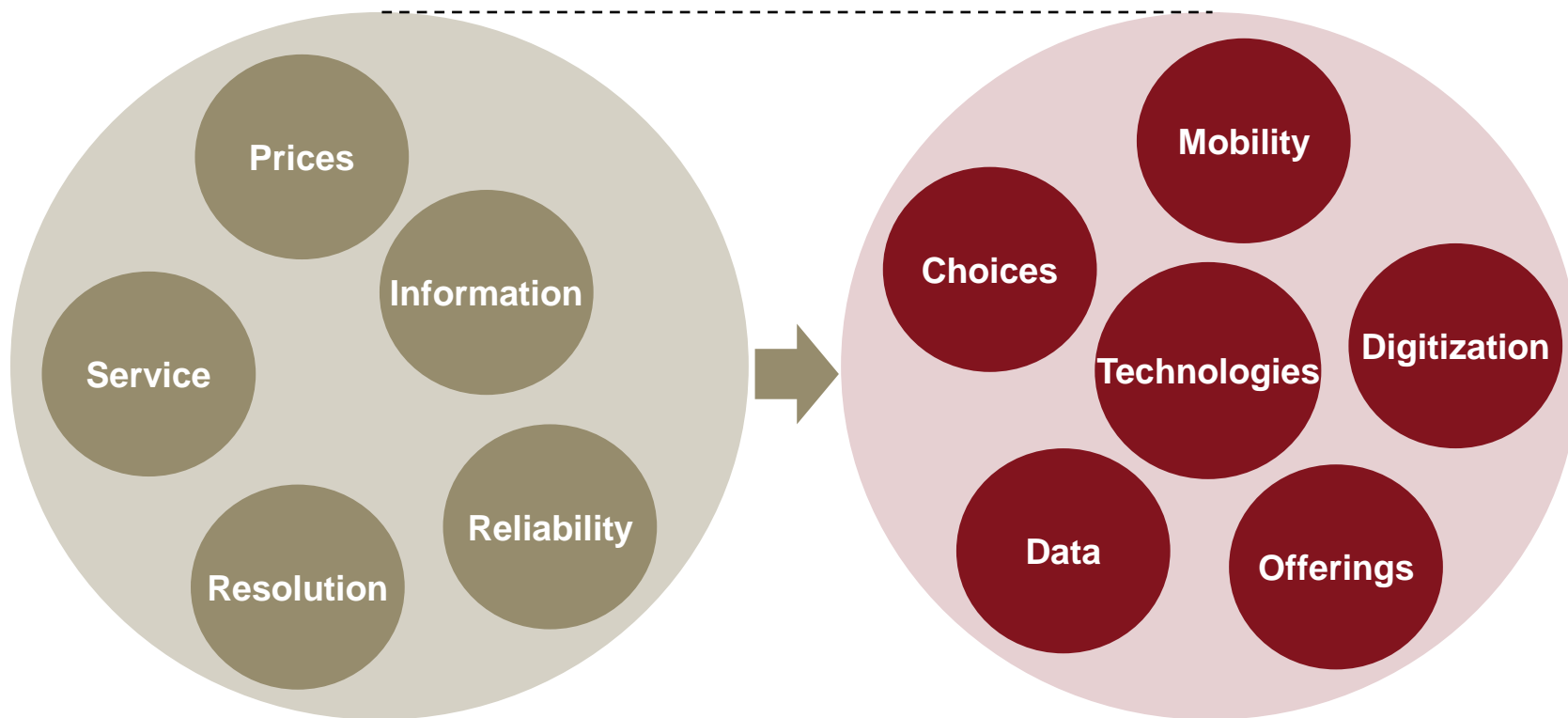


Source: Michael Felton, New York Times

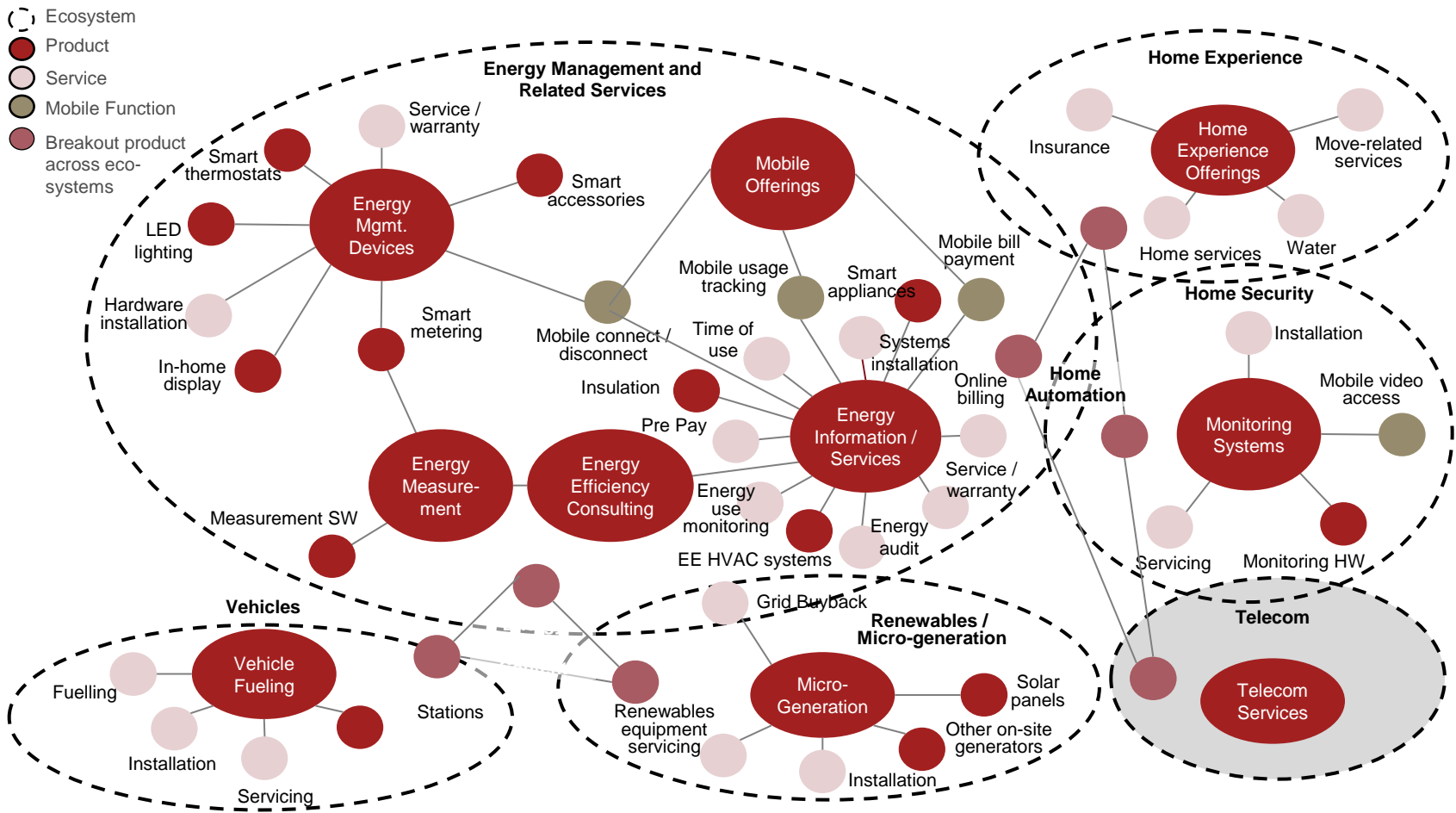
## ***In addition, customers are seeking more engagement with their utilities***

The traditional customer focus of the industry has been on **'performance-based satisfaction'** ...

... with the future focus to be directed to enhanced **'engagement and solutions'**

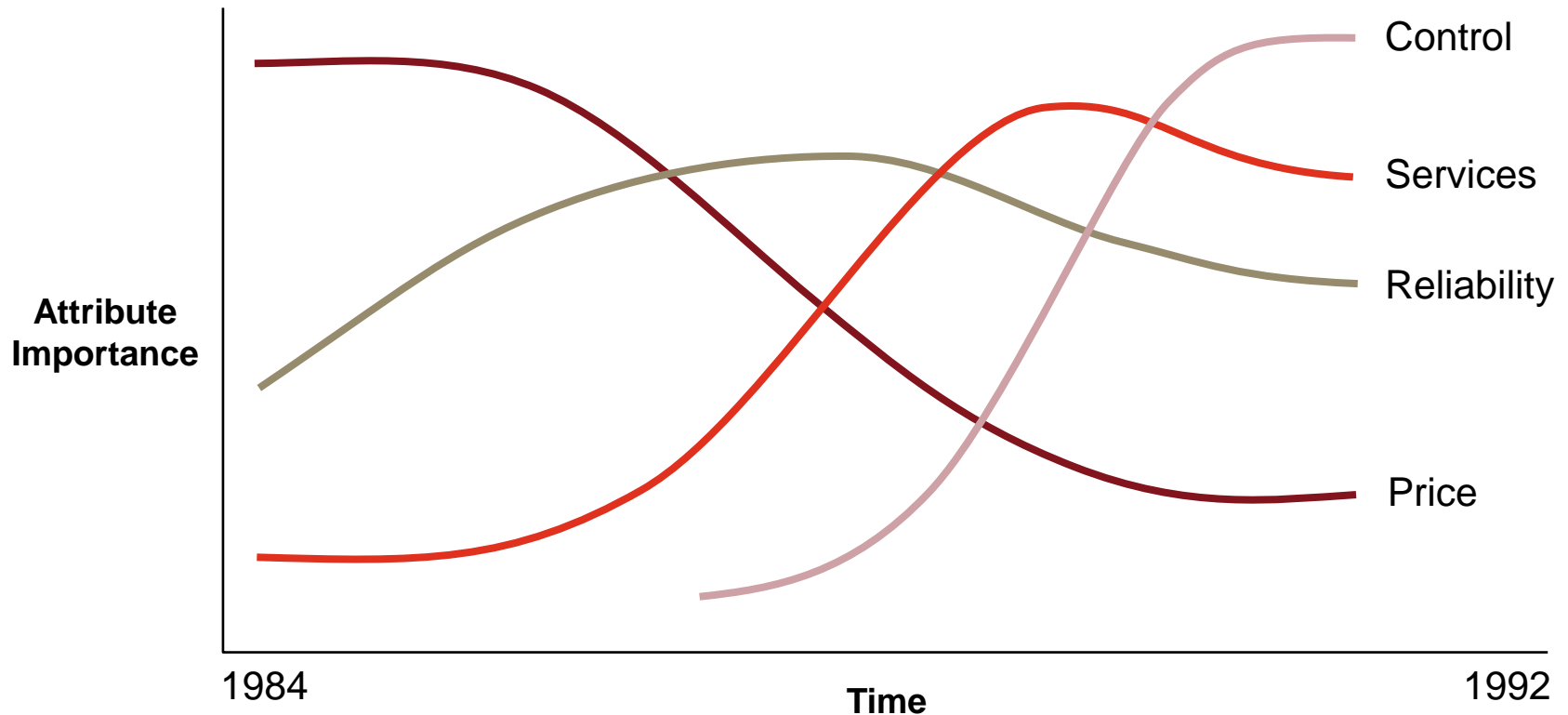


# The electric ecosystem involves a wide set of products, services, and intersections



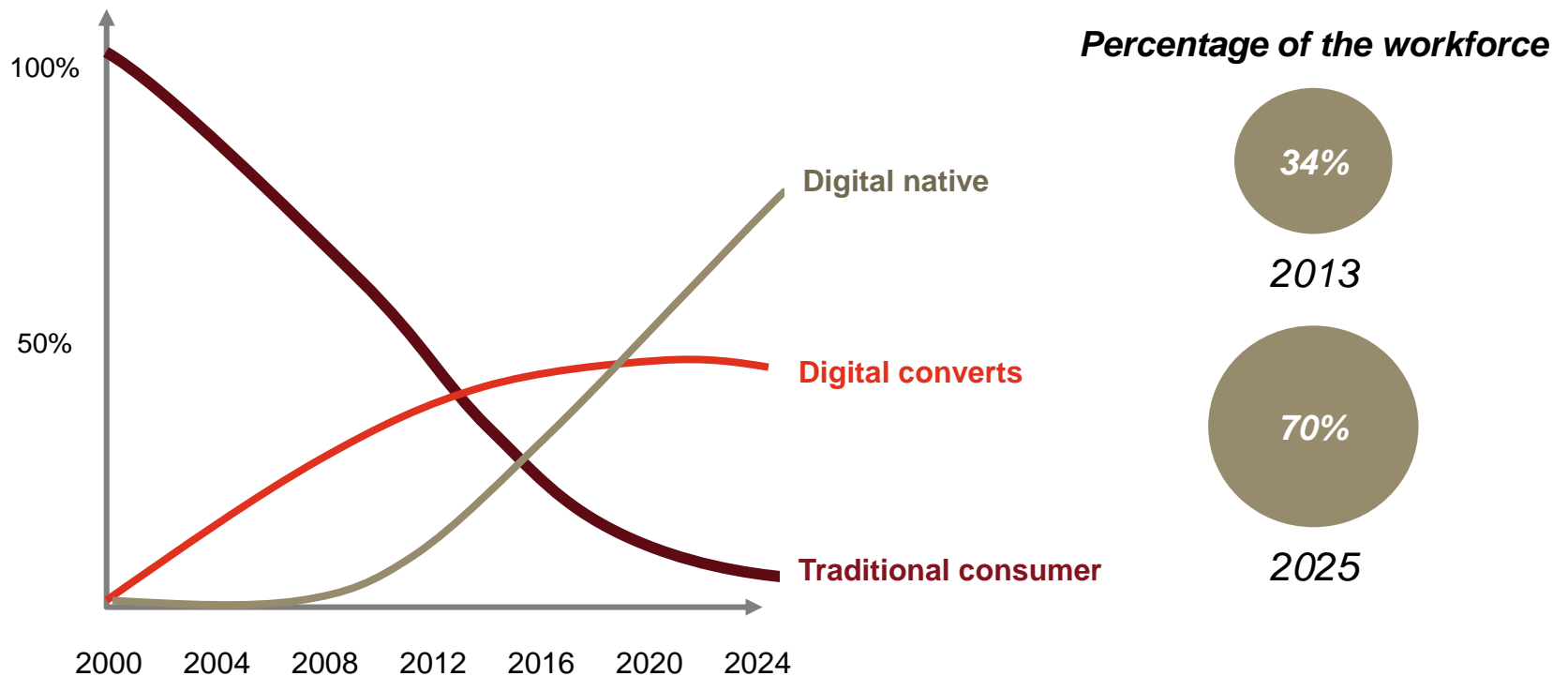
*The telecom sector provides insight into how customer buying attributes can change and reshape markets*

Buying Attributes

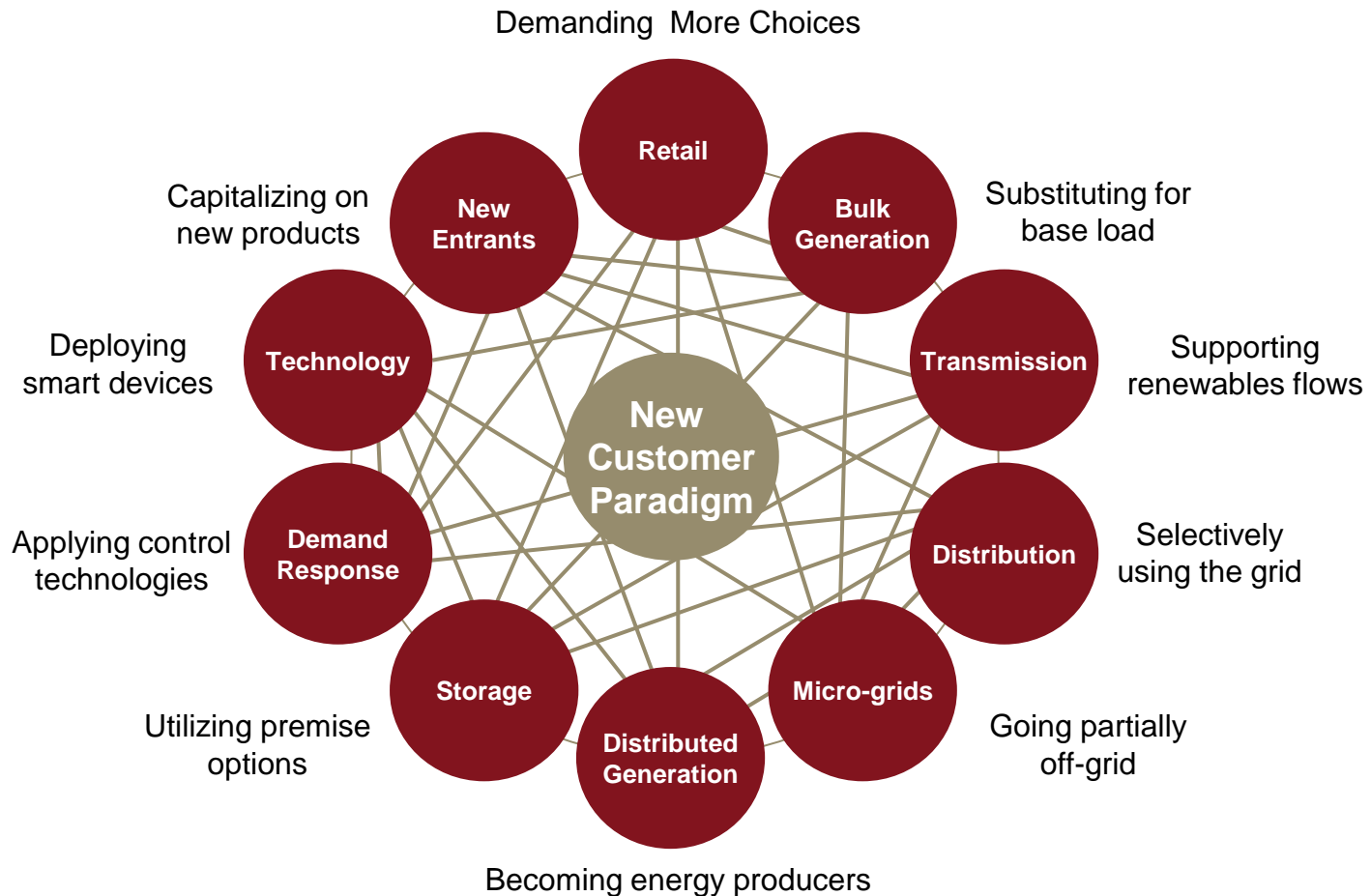


***As customers become increasingly more digitally savvy, they will be emphasizing mobility and information ...***

**Change in Customer Archetypes**



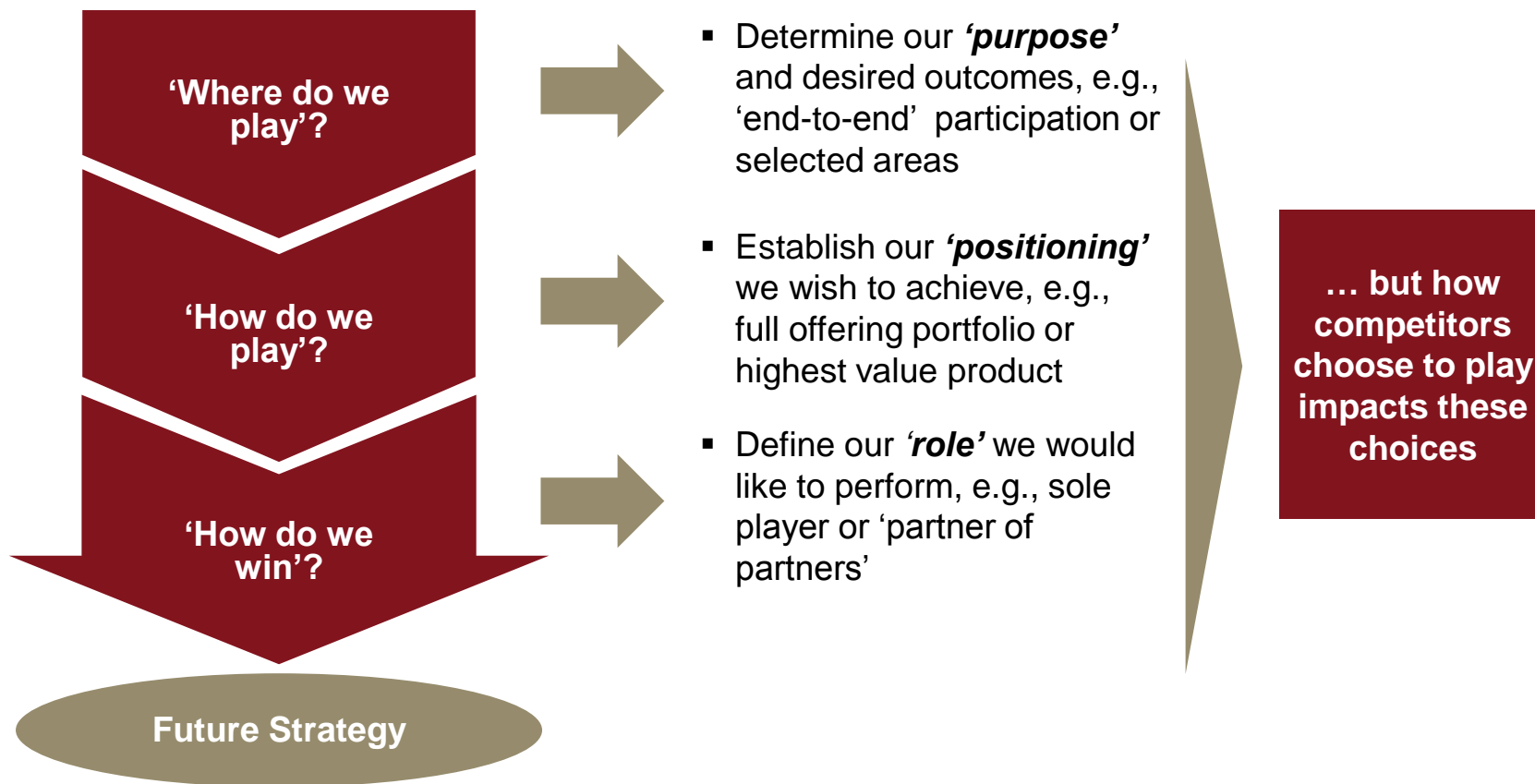
***... and causing incumbent roles to shift to match customer willingness to exercise greater energy choices***



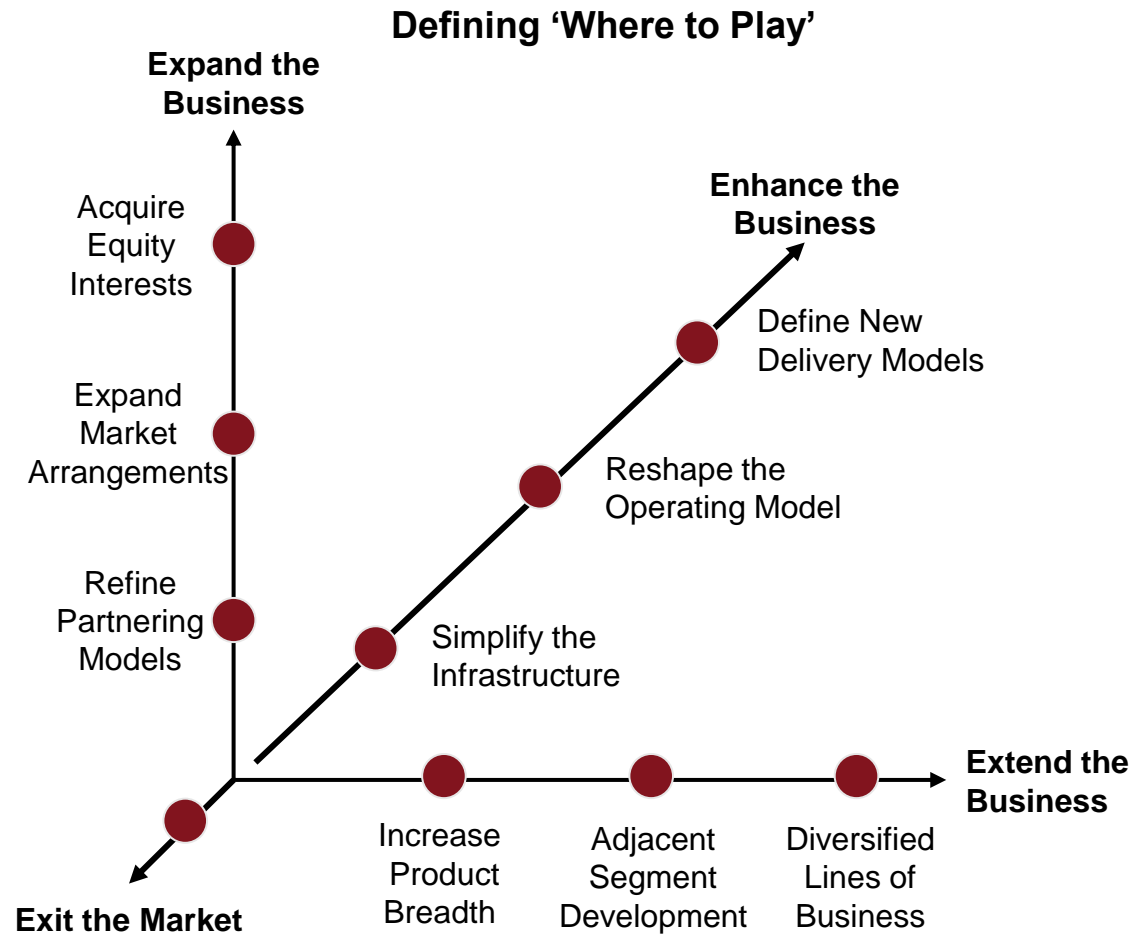


***With these challenges in mind, utilities need to consider multiple strategic and operating model questions ...***

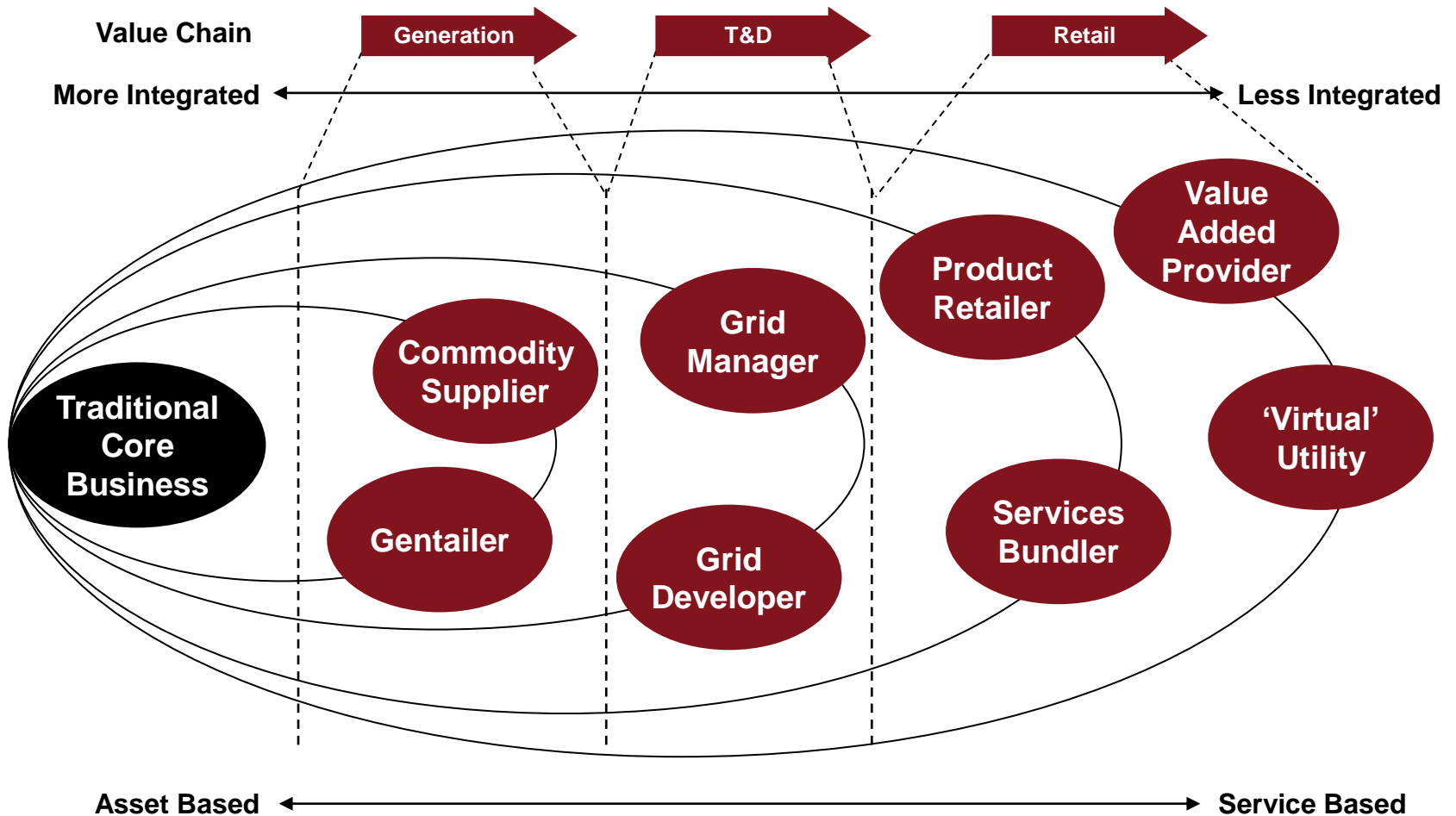
### Foundation Strategy Factors



*... and define 'where' to leverage the range of strategic expansion options and future maturity moves*



***The range of business models for utilities to consider is expanding, though they are not mutually exclusive ...***

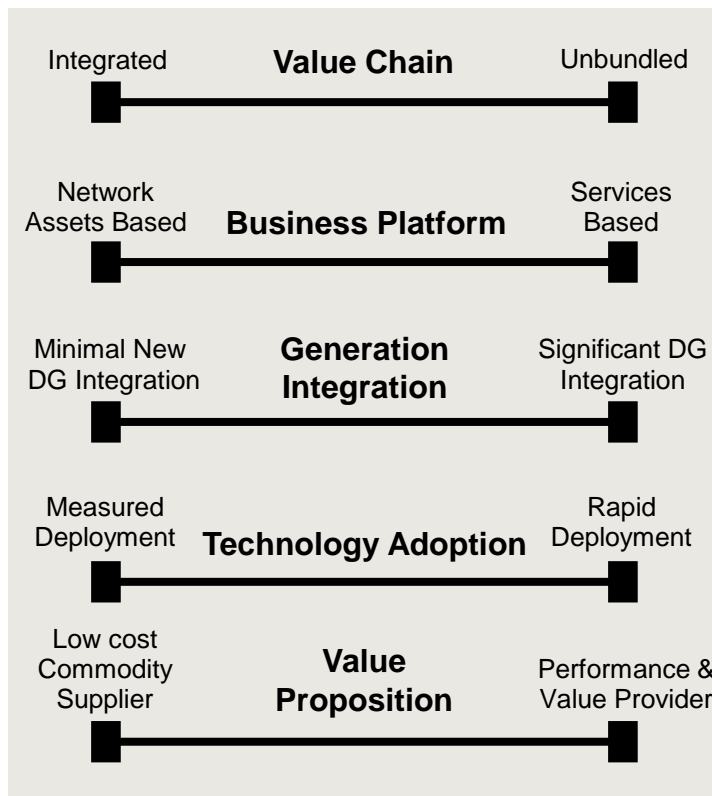


## *... with corresponding implications on business alignment and the basis for profitability*

Business Models	Traditional Core Business	Gentailer	Commodity Supplier	Grid Developer	Grid Manager	Product Retailer	Services Bundler	Value-Added Provider	'Virtual' Utility
Business Focus	▪ Assets - Customers	▪ Assets – Customers	▪ Assets	▪ Assets	▪ Assets	▪ Customers	▪ Customers	▪ Customers	▪ Customers
Business Alignment	▪ Generation – T&D, Retail	▪ Generation - Retail	▪ Generation	▪ Trans- mission	▪ Trans- mission - Distribution	▪ Retail	▪ Retail	▪ Retail	▪ Distribution - retail
Profitability Basis	ROIC	Com- petitive Margin	Com- petitive Margin	Regulated ROIC	Regulated ROIC	Com- petitive Margin	Com- petitive Margin	Com- petitive Margin	Com- petitive Margin

# Utilities will need to decide about some fundamental strategic choices ...

## Range of Strategic Options 'Ways to Play'



## Future Positioning Roles

### Option A: Industry Leader

- Value creation through new business models
- Shape the future industry landscape

### Option B: Cautious Follower

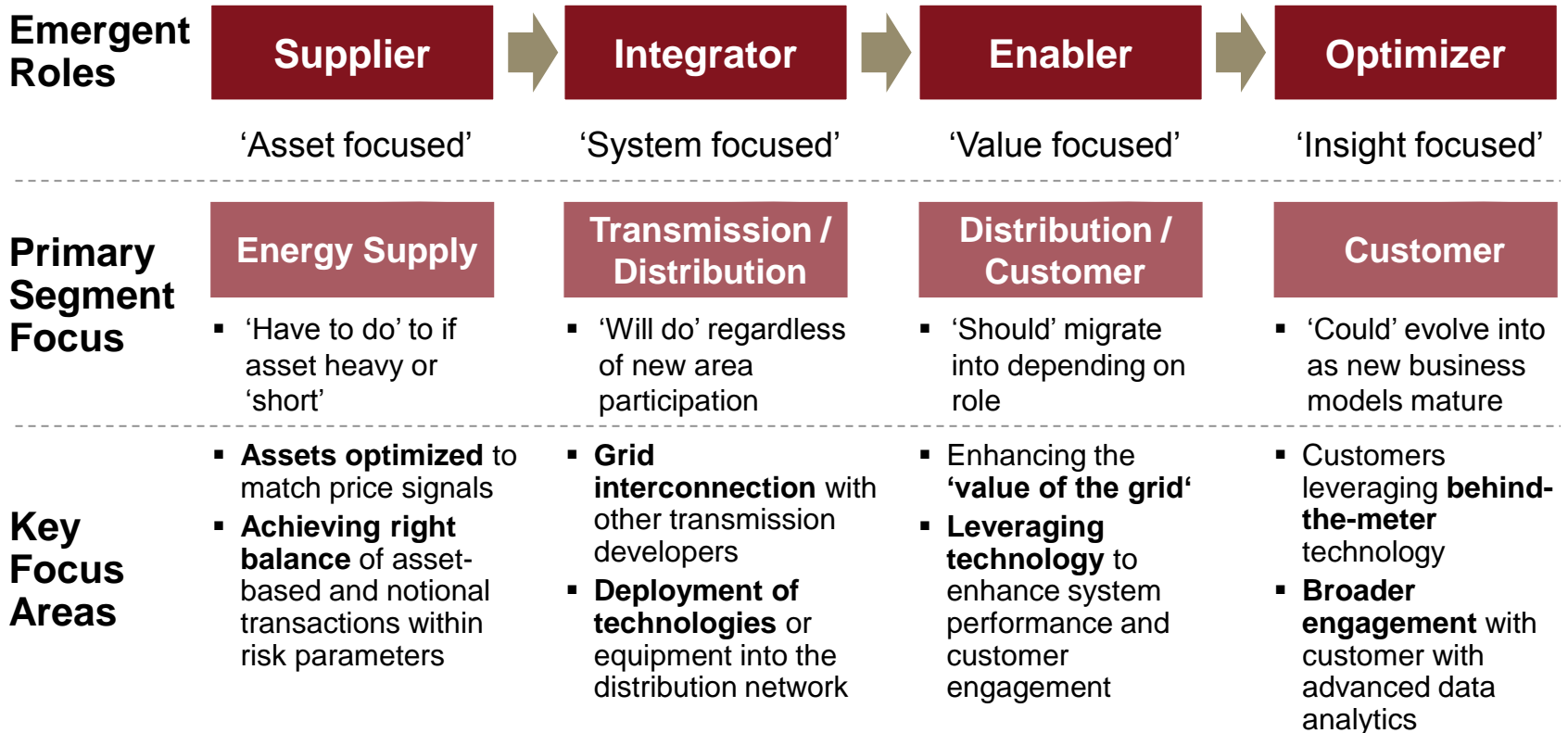
- Value creating through existing models
- Incremental investments

### Option C: Minimal Change

- Risk management through existing models
- No active change initiative

# *... with several value chain participation options to consider*

## Future Role Evolution



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## *The observed experience from past policy shifts provide a glimpse into future policy planning*

### 1 Industry Evolution

- New business models will emerge, but no one model dominates

### 2 Customer Attitudes

- Markets will begin to see the rise of the prosumer

### 3 Electric – Gas Coordination

- Convergence is driving more mutuality and shared objectives

### 4 Technology Deployment

- Will occur faster than anticipated, but with time for adoption preparation

### 5 Transformation Lessons

- Planned outcomes are dependent on both insight and foresight

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## ***Questions or Comments?***



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