IBM Global Business Services

Plugging in the consumer

Innovating utility business models for the future

July, 2008

Agenda

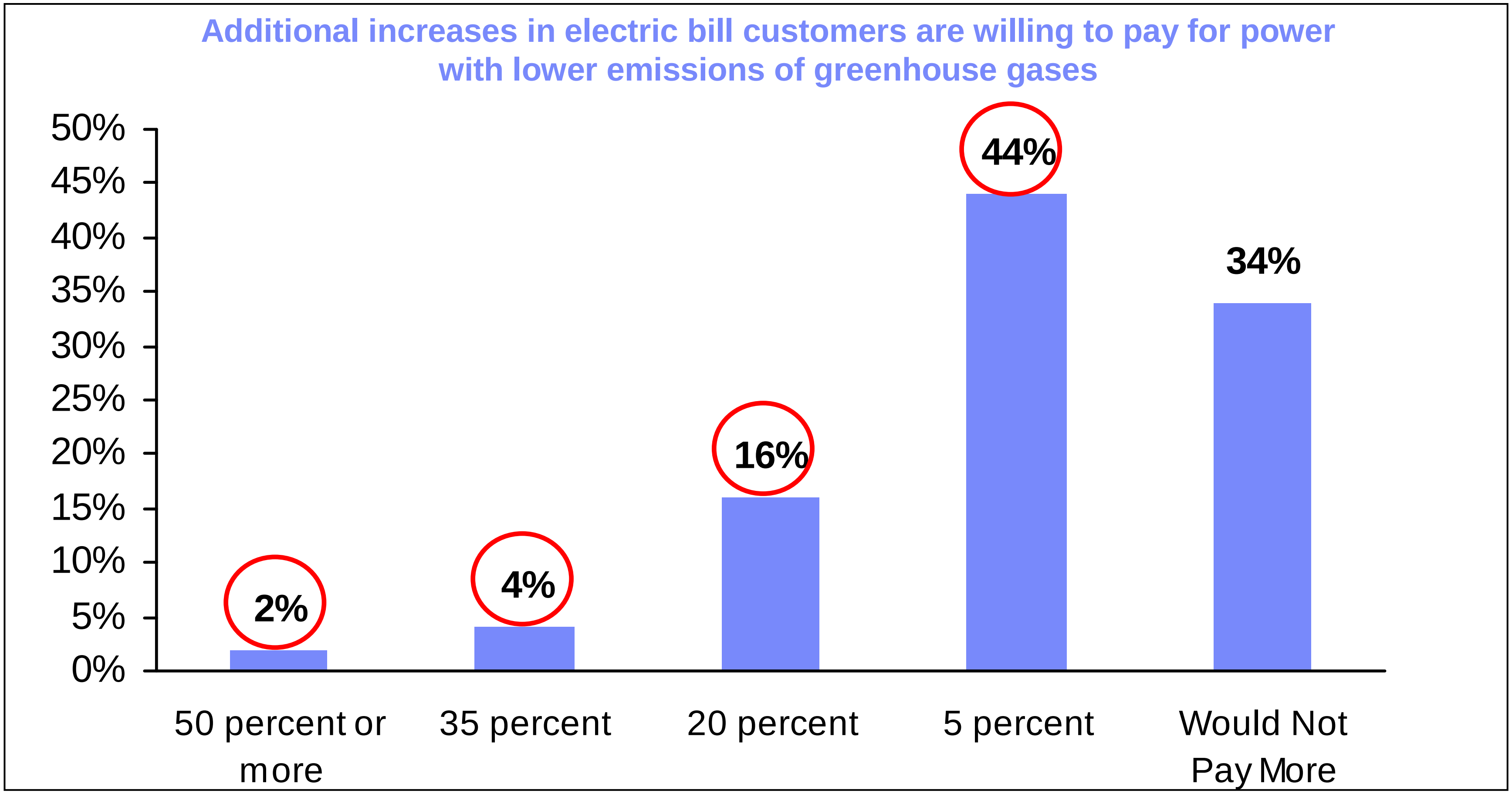
- ***Industry Change Drivers***
- Implications and Future Scenarios
- Imperatives and Recommendations

Empowered, environmentally conscious consumers and maturation of new technologies will drive change as well as new growth opportunities

Past	Evolving Future
Passive ratepayers	Empowered consumers
Limited interaction between grid and home	Connected home
Consumer tolerance for outages	Need for uninterrupted power delivery
Decision-making driven solely by price	Many factors: price, climate change, etc.
Consumers indifferent to GHG emissions	Utilities expected to lower GHG emissions
Highly regulated market	Largely competitive market
Most utilities <5% of sales from renewables	Most utilities >5% of sales from renewables
Centralized generation	Decentralized generation
Climate of political opposition to nuclear	More positive policies toward nuclear

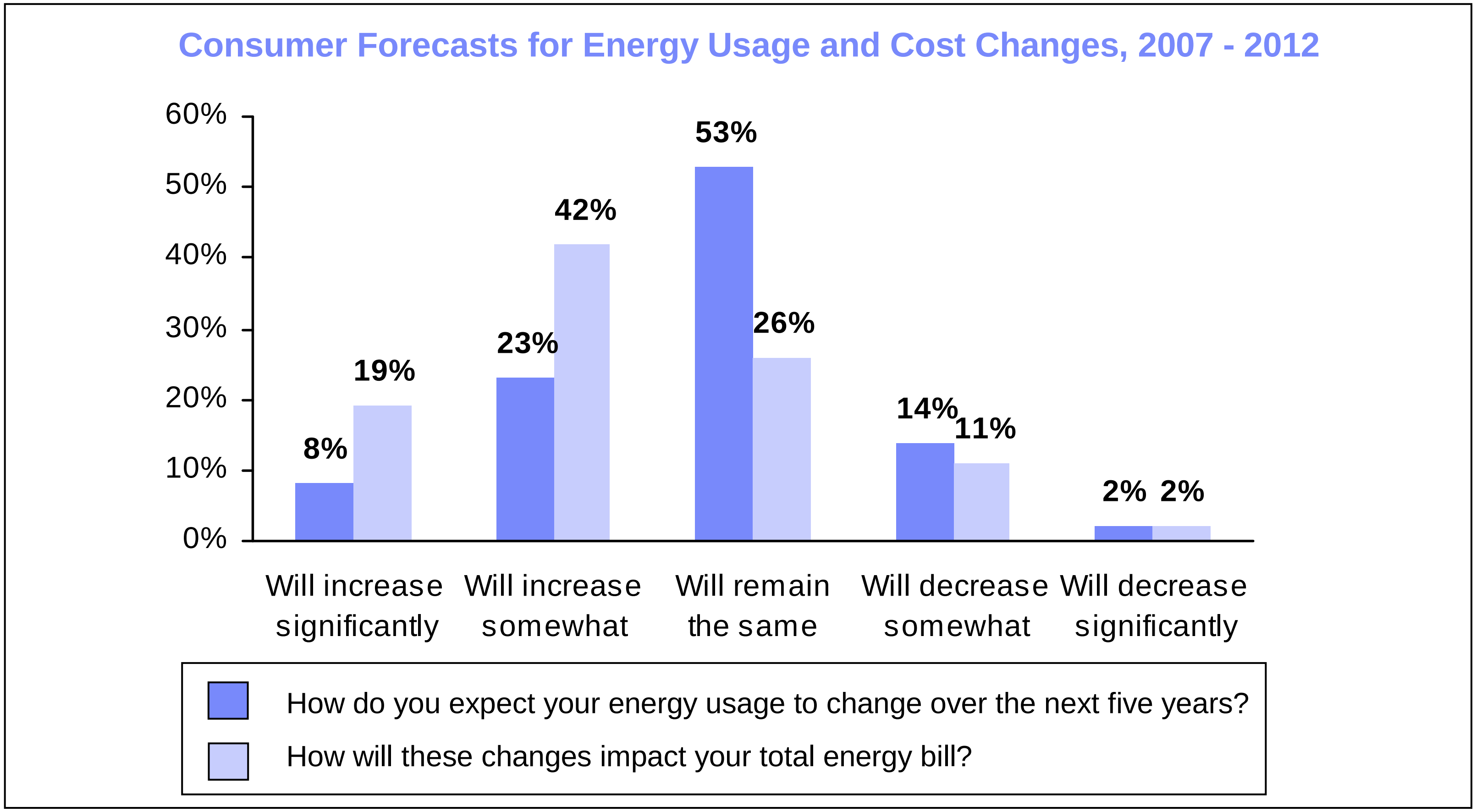
This evolution points to change that requires more consumer interaction with utilities in the face of carbon constraints and major technological shifts

About two-thirds of customers are willing to pay some premium for "green energy"



By 2012, the percentage of utilities with more than 10% of their generation coming from renewable sources will more than quadruple from 2002 levels

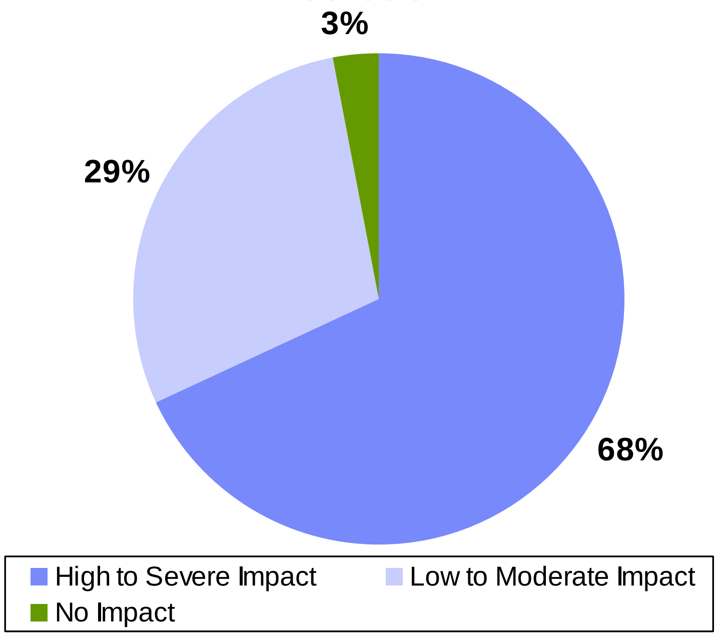
Only 30% of households expect their energy usage to increase over the next five years – but 60% expect higher bills



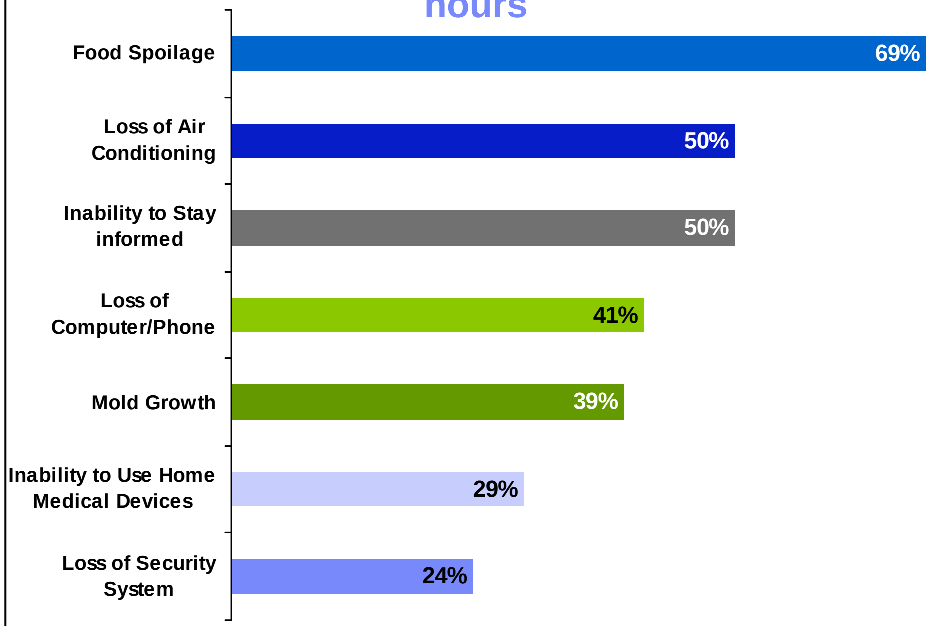
Despite major publicity and government efforts to encourage energy efficiency, only one in six expect their energy usage to decrease

Consumers' increased sensitivity to and decreased tolerance of power outages

Percentage of households' described impact of power outages over two hours in duration



Issues homeowners would be concerned about in the event of a power loss that lasted more than 24 hours



Sources: IBM Utility Customer Survey, 2007; "Survey Shows Nearly 50 Percent of Residents in 'Hurricane States' Expect to Lose Power This Season," Propane Education & Research Council (PERC), July 16, 2006

Smart meter installations are growing worldwide, enabling communication between utilities and customers to better manage cost and consumption

Utilities around the world are implementing large scale smart metering programs

Some 1.2 million smart meters were expected to be installed in Ontario by the end of 2007, well above the provincial government's target of 800,000

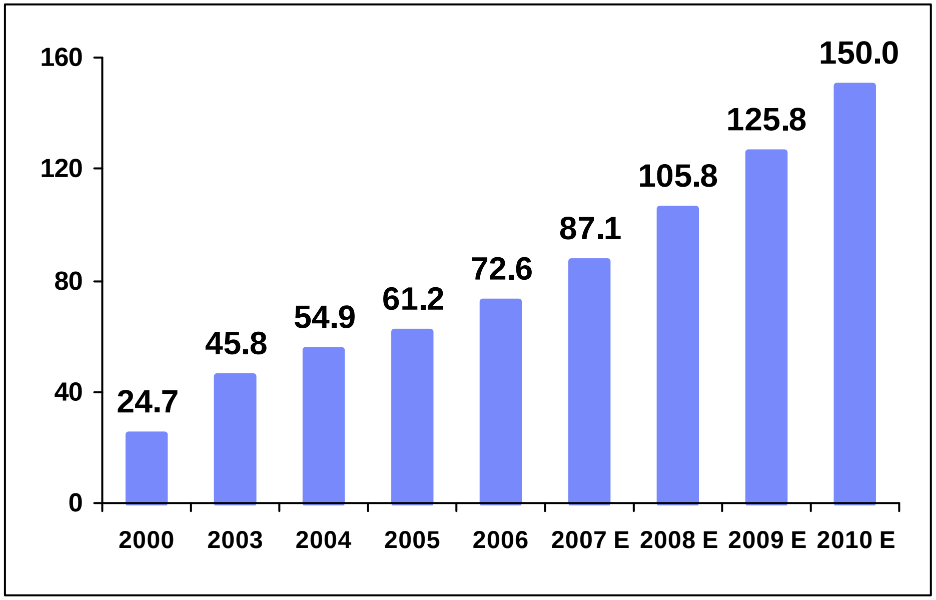
In December 2006, Italy's ENEL completed the installation of over 30 million smart meters to its customers – the largest smart meter project to date

The Australian government has committed to the progressive national roll out of smart meters from 2007 to 2011 – many utilities have already begun to implement programs with their customers

In the US, almost 50% of the states have utilities with smart metering pilots or installations, with significant efforts underway in California, New York, Ohio, Pennsylvania, and Texas

Worldwide Growth in Installed AMR

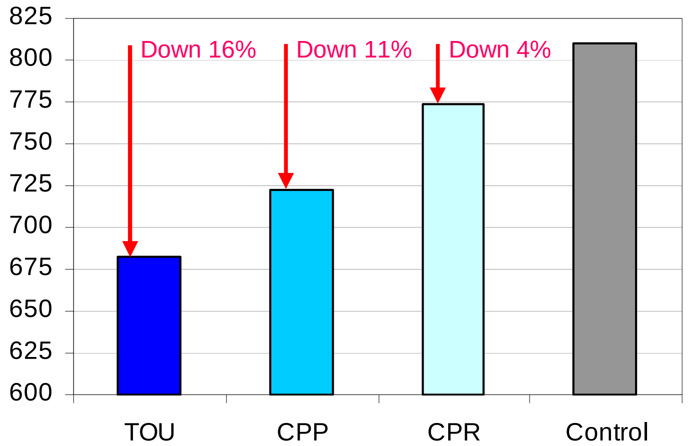
(Million Units, Actual and Projected)



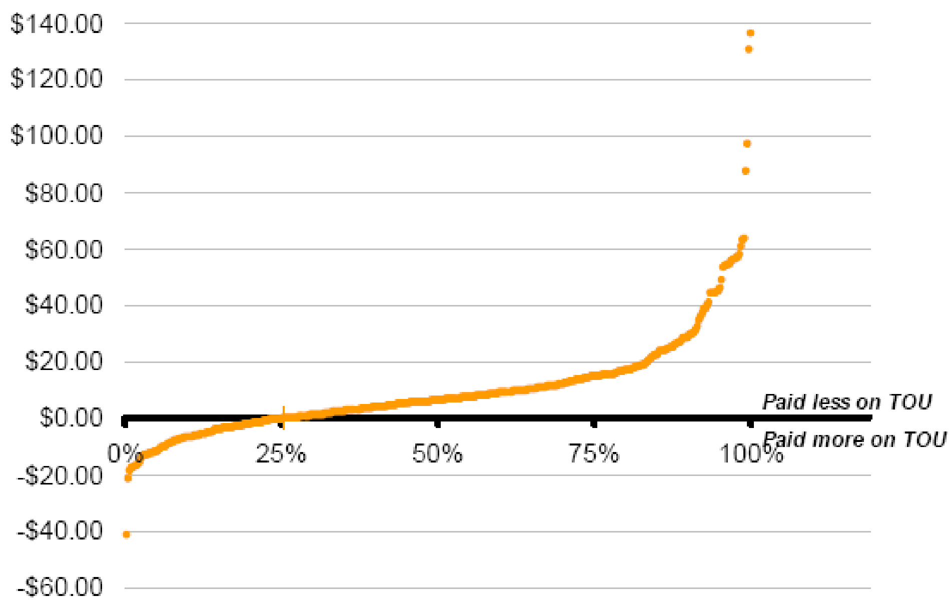
Other countries with smart metering initiatives include Austria, Denmark, France, Malta, the Netherlands, Norway, Sweden, the UK, New Zealand, Honduras, and the Dominican Republic

A recent Ontario Energy Board smart price pilot demonstrated measurable peak shifting, energy conservation, and reductions in total customer costs

Average Monthly Usage per Cost Group, kWh



Total TOU Savings Over the Pilot Period, all customers (dollars)



Shifts in Consumption on Days Critical Peak Declared

Summer	TOU	CPP	CPR
Critical Peak Period (3 or 4 hours during the peak)	5.7%	25.4%	17.5%
Entire On-Peak Period	2.4%	11.9%	8.5%

Note:

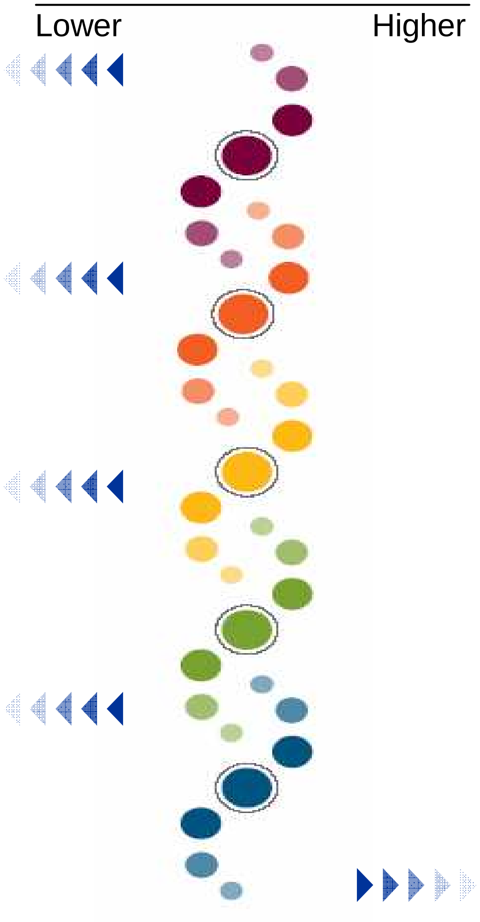
Total participants: 373 (TOU, 124; CPP, 125; CPR, 124)

Control group participants: 125

Source: “Ontario Energy Board Smart Price Pilot Final Report,” July 2007, Prepared by IBM Global Business Services and eMeter Strategic Consulting for the Ontario Energy Board.

Utilities CEOs recognize that disruptive innovation is required, but they are concerned about their ability to manage change

Focus: Utilities versus All Global*



- **Hungry for Change**: Almost 70% of utility CEOs see substantial change as inevitable over the next three years, dominated by environmental and regulatory issues
- **Innovative Beyond Customer Imagination**: Almost two in three utility executives see more informed and collaborative customers bringing positive changes to the industry, and spending on customer relations and programs is ramping up in advance
- **Globally Integrated**: Utility companies see the world much more locally than CEOs in most other industries, but this is not surprising given the physical constraints on energy sales versus other products
- **Disruptive by nature**: Utility CEOs prefer innovation in business models over structurally redefining the industry or innovating business models; is this view too conservative given technological change and customer demands?
- **Genuine, not just generous?**: Utilities are well ahead of most other industries on investment related to corporate social responsibility, particularly that related to environmental initiatives

Source: IBM Global CEO Study 2008; n (Global) = 1130; n (E&U) = 29

* Arrows to the left (right) indicate utility focus is less than (greater than) global, all-industry sample

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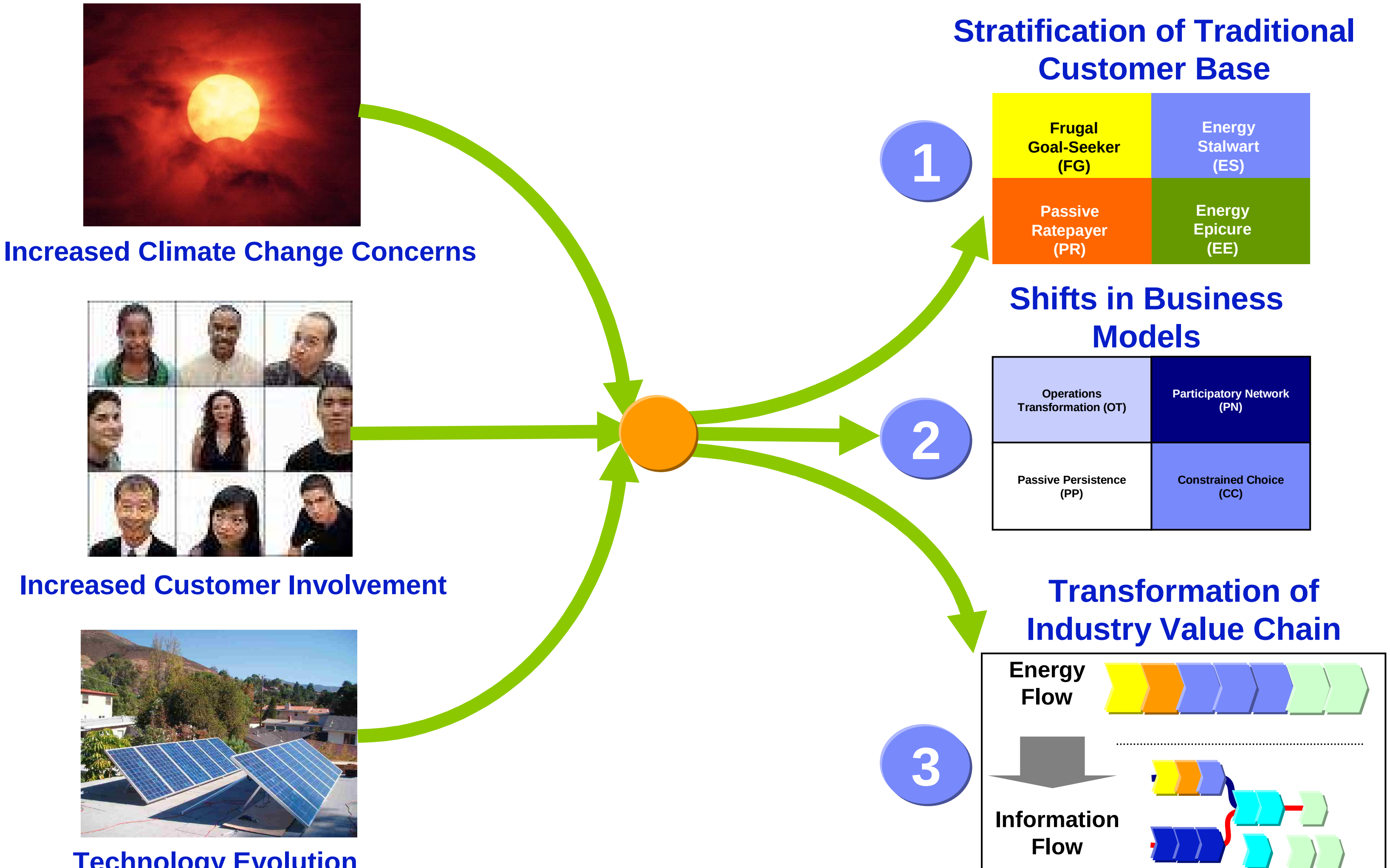
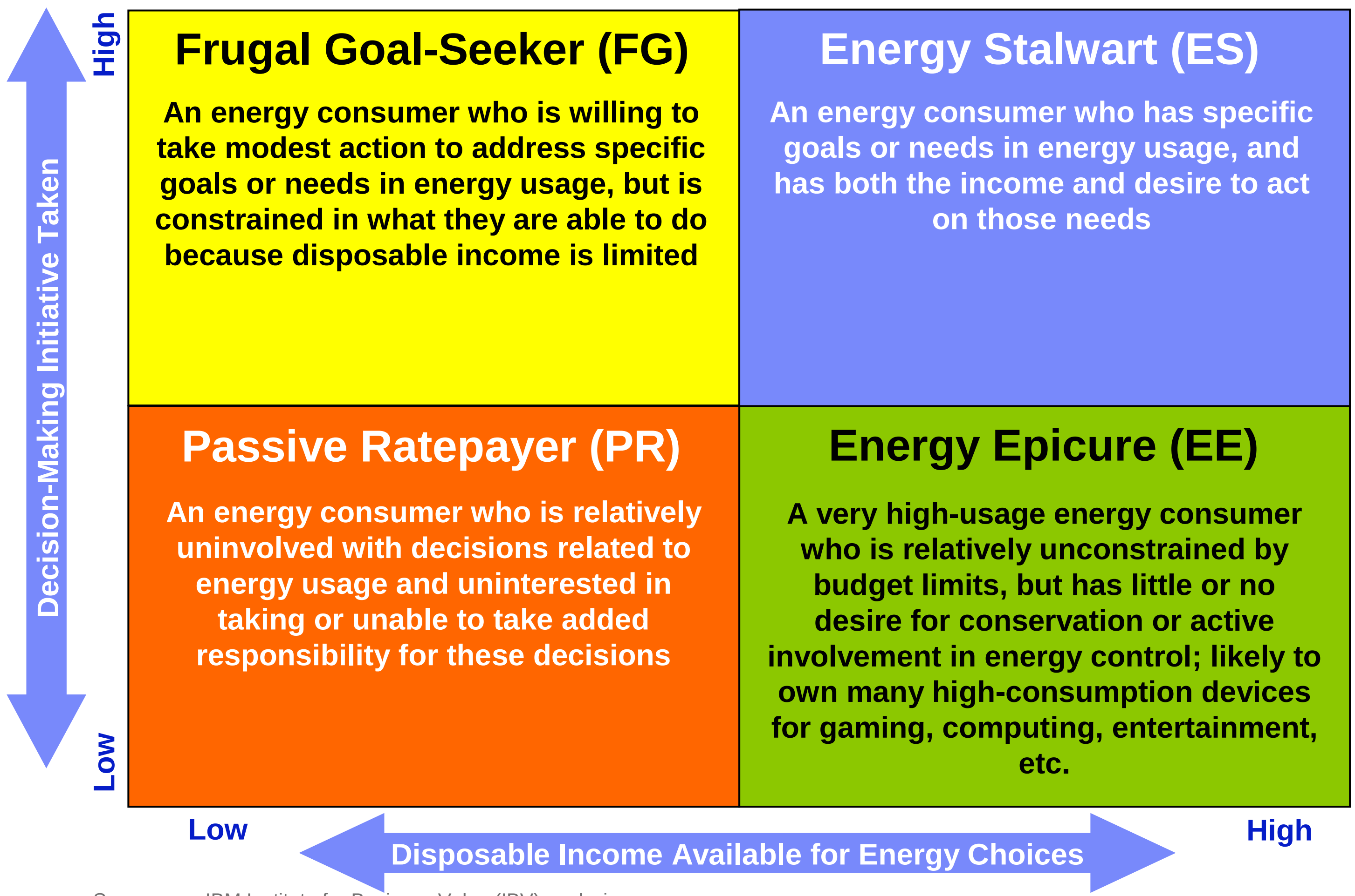
The convergence of increased climate change concerns, customer control and technology will produce new customer segments and industry models



Source: IBM Institute for Business Value (IBV) analysis

Decision-making responsibility taken and income available for energy choices will lead to different types of behavior

Residential and Small Commercial Energy Customers



Two factors will determine the nature of the interface between utilities and consumers in the future:

1. The degree to which consumers **take initiative in decision-making** in their energy supply and usage toward meeting specific goals
2. The consumers' **disposable income available for energy choices** in supply and conservation

Source: IBM Institute for Business Value (IBV) analysis

Changes in the way power is generated and delivered to customers will result from shifts in technology and customer-utility interaction

- **Two variables will most affect the industry value chain:**
  - Technology evolution, primarily across three categories:
    - Smart Metering
    - Network Automation and Analytics
    - Distributed Generation
  - The degree of control that consumers have over decisions made along the value chain for power delivery, usage, and management
    - At one extreme (*low control*), a completely "utility-controlled relationship" over which consumers have virtually no leverage on infrastructure (including generation) and business decisions
    - At the other extreme (*high control*), a "customer-driven experience", in which the consumers can control many of the dimensions of the transaction
    - Key enablers of increased customer involvement are the *ready access to and use of new information on energy supply and management options* and the *removal of barriers to increased participation*
- **The development of technologies and decision bases relative to one another will determine the dominant business models within which utilities and customers will interact in the future**

Source: IBM Institute for Business Value (IBV) analysis

If consumers elect to take more responsibility for their energy usage, they will reap more benefits from technological advances

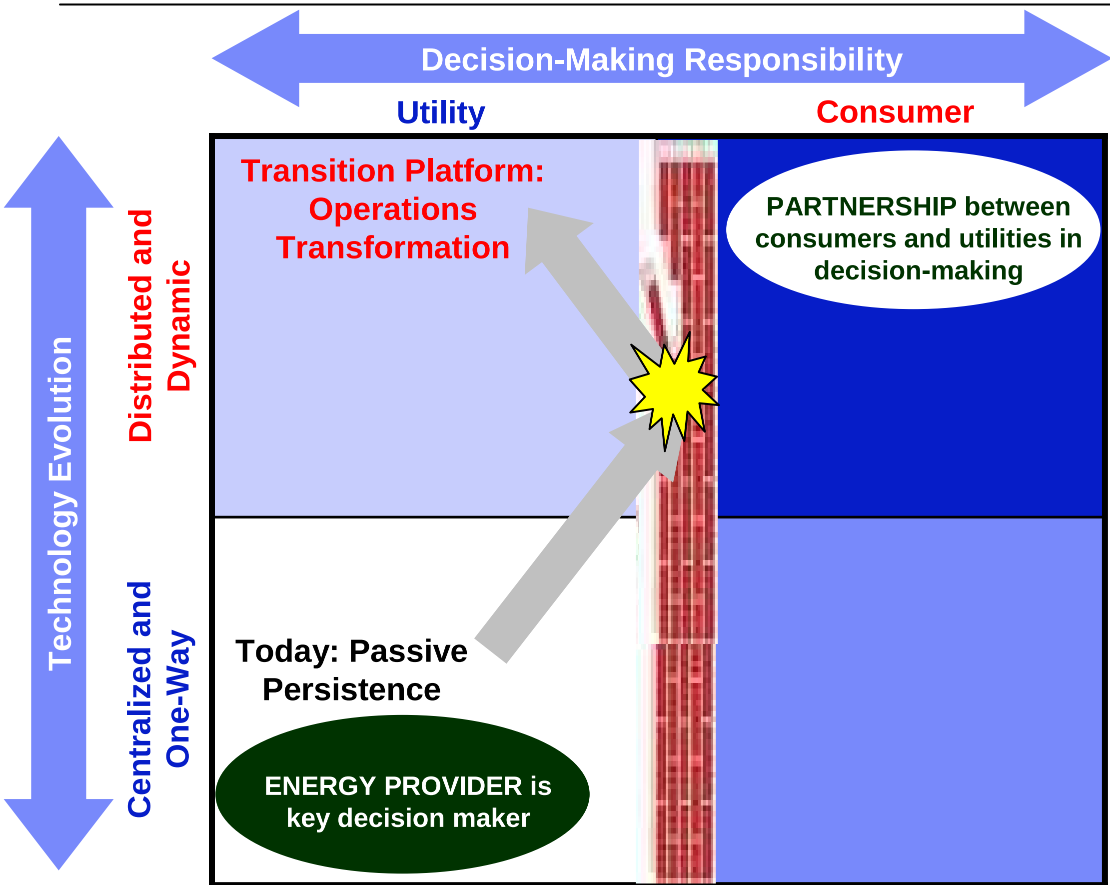
Utility Industry Models 2007—2017

Technology Evolution	Degree of Consumer Control: Low	Degree of Consumer Control: High
Distributed and Dynamic	**Operations Transformation** Some combination of grid and network technology evolves to enable shared responsibility, but consumers either cannot exert much control or elect not to and the balance of benefits favors the utility	**Participatory Network** A wide variety of grid and network technology evolve to enable shared responsibility, and consumers' strong interest in specific goals creates new markets (virtual and physical) and new product demands, which balances benefits more equally between the consumers and utilities
Centralized and One-Way	**Passive Persistence (PP)** Traditional utility market structures dominate, and consumers either accept or prefer the traditional supplier-user relationship	**Constrained Choice (CC)** Consumers take firm steps to move toward more control, but are limited to certain "levers" (technologies, behaviors, or choices in providers) by regulatory and/or technological constraints

Low — Degree of Consumer Control — High

Source: IBM Institute for Business Value (IBV) analysis

If consumer interest in or regulatory structures for consumer control is weak, utilities will benefit from Operations Transformation in the interim



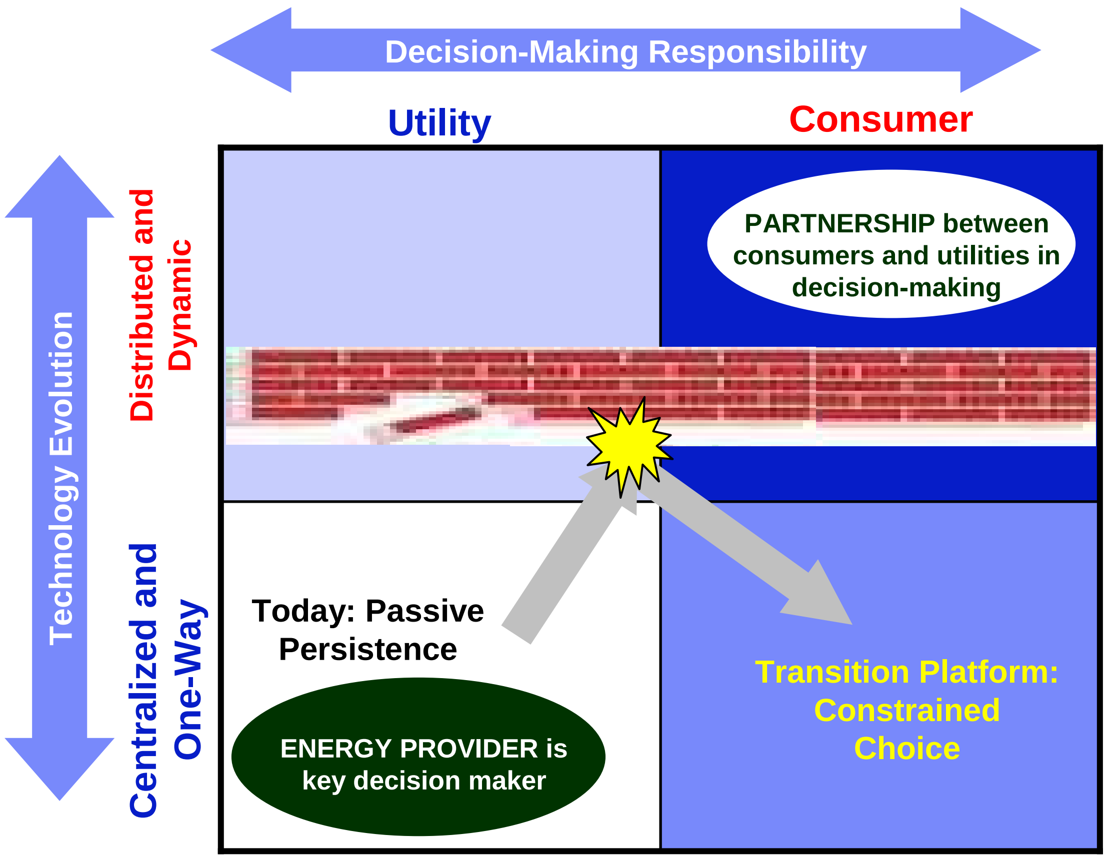
In Operations Transformation, consumers either cannot exert much control or elect not to, and the deployment of new technologies, on balance, benefits the utility

Source: IBM Institute for Business Value (IBV) analysis

Economic and Technology Blockers

- Lack of education on options
- Regulation/legislation to enable customer control not enacted
- Rate structures that promote involvement (e.g., time-of-use) not in place
- Insufficient choice in competitive markets or lack of competitive market
- Insufficient technology options for viable deployment on wide scale
- High interest rates and/or housing costs which decrease affordability
- Low primary fuel costs which hinder competitiveness
- Insufficient consumer incentives for alternative options
- Lack of feed-in or sell-back tariffs to promote distributed generation

If customers demand more control but technology deployment is blocked or delayed, utilities will need to prepare to compete in Constrained Choice



Economic and Technology Blockers

- High cost of capital or other capital constraints
- Technologies slower to deploy than forecast
- Insufficient standardization, making integration of network elements difficult
- Lack of cost recapture mechanism in standard tariffs
- Insufficient business cases for technology deployment
- Regulation/legislation to enable new business structures not enacted
- Lack of feed-in or sell-back tariffs to promote distributed generation on consumer side

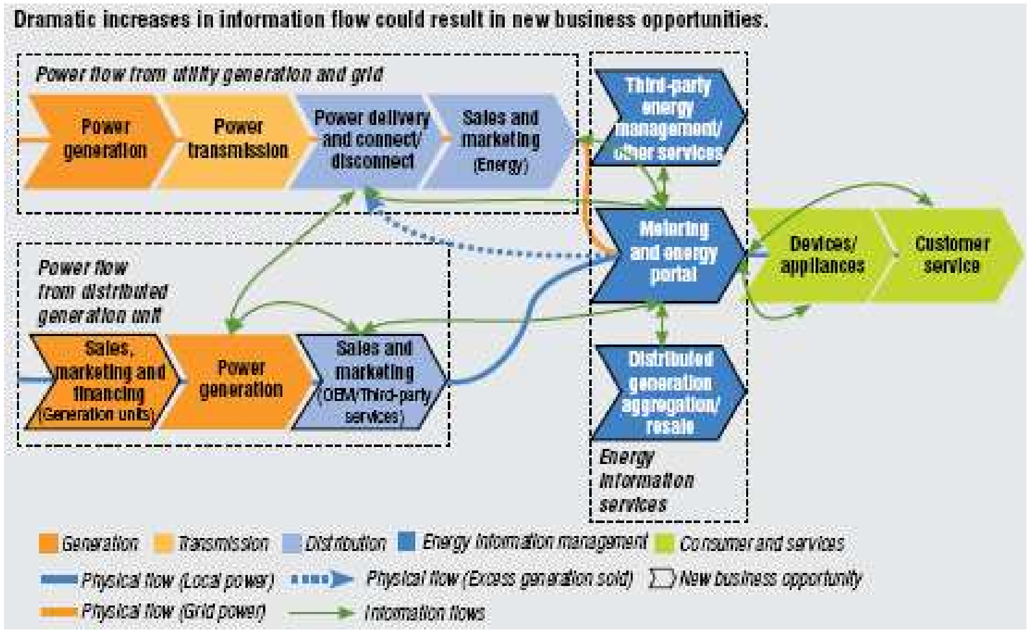
In Constrained Choice, consumers take firm steps to move toward more control, but are limited to certain "levers" (technologies, behaviors, or choices in providers)

Source: IBM Institute for Business Value (IBV)

The new, two-way flows of information over an intelligent grid with increased customer participation will be the key to a major value chain shift

Traditional value chain

In the Participatory Network value chain, new consumer-focused business niches emerge, giving consumers more flexibility and choice



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Although these actions work toward achieving different goals, all prepare utilities for an eventual move to a more participatory network

1. ***Invest in understanding customer behavior and expectations***

2. ***Develop a long-term strategy for transitioning to a participatory network model***

   Exploit advances in technology to improve operational efficiency, and use these to lay the foundation for competing in the participatory network

   Provide customer groups with education and targeted programs that allow them to assume a level of responsibility for energy decisions with which they are comfortable

   Assess the regulatory environment for each step to leverage enabling factors

3. ***Develop a strategy for capturing value from new flows of customer information***

Source: IBM Institute for Business Value (IBV) analysis