The outlook for growth in electricity consumption

PJM Grid 20/20 Conference
Audubon, Pennsylvania

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June 3, 2014
Normal electricity growth has not resumed four years after the Great Recession ended

- According to Dr. John Caldwell of the Edison Electric Institute, normal growth usually resumes within five months after the recession ends; the longest it has ever taken has been twelve months.

- The EIA's May 2014 Short-Term Energy Outlook (STEO) projects that electric retail sales will grow by 2.3% in 2014 and 0.0% in 2015; in the residential sector, the corresponding growth rates will be 3.1% and -1.5%.
Electricity sales and the recovery

Sources: John Caldwell, EEI and the US Energy Information Administration
Of course, declining growth has been the norm and not the exception since 1950

U.S. Electricity Demand Growth, 1950-2035 (percent, 3-year moving average)

Source: EIA, 2012 Annual Energy Outlook
Three new forces have shaped the recent drop in growth

- First, consumer psychology has shifted as a new generation of consumers has arrived with new values and norms; new technologies are pushing them to explore the frontiers of energy efficiency on their own; and they are into belt-tightening, faced with continued economic uncertainty

- Second, utilities are stepping up their spending on energy efficiency programs, often prompted by energy efficiency standards and new legislation

- Third, states and federal governments are continuing to push ahead with aggressive enhancements to codes and standards
Consumer confidence continues to be a drag on consumer spending

Index of Consumer Sentiment – Recent Changes

Pre-Recession Avg. (Jan-2003-Nov-2007) = 89.1

Post-Recession Avg. (Jun-2009-Nov-2013) = 73.0

Several states have passed laws either requiring or promoting energy efficiency

EERS Policy Approaches by State (As of September 2012)

Source: American Council for an Energy-Efficient Economy
New codes and standards could dramatically decrease baseline energy consumption

Impact of Codes and Standards on Total U.S. Electricity Consumption (TWh)

Source: IEE, Assessment of Electricity Savings Achievable through New Appliance/Equipment Efficiency Standards and Building Efficiency Codes (2010-2025)
Two more forces have appeared on the horizon

- The fourth force is distributed generation, led by the revolution in rooftop solar and supplemented by micro turbines.

- Rooftop solar is approaching grid parity, capitalizing on heavy upfront cash subsidies and spurred on by net metering tariffs that over-compensate solar customers.

- The leasing model pioneered by SolarCity is being copied rapidly by others.

- The fourth force alone can eliminate load growth.
Net metering enables distributed generation to expand

- In 2003, there were less than 7,000 U.S. customers on net metering
- By 2012, there were 297,000 (roughly half in California)
- That amounts to 0.2% of all U.S. residential customers
- In 2012, Hawaii had the highest share of residential customers on net metering (5%)

Sources:
With distributed generation, net-zero energy homes become a reality

- In Austin, Texas, the Zero Energy Capable Homes program requires that new single-family homes be net-zero energy capable by 2015

- The largest community of net-zero homes in the U.S. is rising in West Village at UC Davis in California

- The California Energy Commission has called for all new residential construction to be zero net energy by 2020 and for all new commercial construction to be zero net energy by 2030
The fifth force is fuel switching

- The revolution in shale oil and gas is pushing fuel prices downwards
- The use of gas for commercial air conditioning and in industrial process is going to become economic, leading to significant inter-fuel substitution away from electricity in the commercial and industrial sector
- Gas-fired residential heat pumps may also begin making inroad into the home HVAC market
To succeed, utilities will need to rethink three core business processes involving the customer

- Sales forecasting
- Load and market research
- Rate design
Rethink sales forecasting

- Sales models have been over-forecasting sales for the past five years because a key element is missing in the math – changing customer tastes and behavior, i.e., an inward shift in the demand curve.

- The new models need to learn from how firms in competitive industries do their sales forecasts; besides relying on trend lines, they need to include insights from observational market research which involves frequent and ongoing interactions with consumers.

- Quantile Regression rather the Ordinary Least Squares may provide better forecasts of peak demand.
Rethink load and market research

- They need to be integrated and carried out on the same groups of customers, consistently over time.

- Additionally, competitor offerings need to be studied and customer perceptions about those offerings gleaned from observational market research.

- The objective should be to yield insights not just about the past and current patterns of use but about likely future changes.
Rethink rate design

- Shift from one-part volumetric rates to three-part rates that reflect costs more accurately and improve equity and efficiency
- The first part should be a fixed charge to cover metering and customer care services
- The second part should be a demand charge that covers the cost of being connected to the grid
- The third part should be a time-varying energy charge
In closing

- The slowdown in sales growth is not an aberration but very much in line with the trend we have seen over the past six decades.

- However, it is being driven by forces that are unique to the present circumstances, three of which have already manifested themselves and two of which loom on the horizon.

- This is the time to rethink three core business processes involving the customer.
Continuing the conversation


Continuing the conversation (continued)


Continuing the conversation (concluded)


Dr. Ahmad Faruqui is a Principal with The Brattle Group whose work is focused on the full spectrum of customer-side issues involving demand forecasting, rate design, energy efficiency, demand response, and the smart grid broadly speaking. He has worked for more than three dozen utilities around the globe and testified before a dozen state and provincial commissions and legislative bodies. His work has been cited in *The Economist, The New York Times*, the *Washington Post* and *USA Today*. He has appeared on Fox Business News and National Public Radio. The author, co-author or editor of four books and more than 150 articles, he holds a Ph.D. in economics from The University of California at Davis and B.A. and M.A. degrees in economics from The University of Karachi, Pakistan.

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