

# Utilization and Customer Behavior: Smart Choices for the Smart Grid

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# Overview

A more robust retail rate design is critical to alleviate various market inefficiencies

- Inefficient consumption decisions under flat-rates
- Excessive capacity investment
- Market power execution and price spikes (motivates bid mitigation and price-caps and subsequently, capacity payment mechanisms)

This study highlights the key issues, innovations, and ways to measure consumers' price-responsiveness via experiments

- Non-price-based motivations are often overlooked (“nudges”)
- Introduces various important research future topics
- Provides insights to policy makers and regulators

## Comments and Suggestions

Motivating decision makers to institute randomized experiments in their pilot programs is essential

Ontario has instituted first system-wide Time-of-Use pricing mechanism (Ontario: 4.5 million residential AMI - 90%)

- Issue: Not a randomized experiment
- Brattle Group Study finds load shifting, but limited conservation
- Data issues and Endogeneity concerns

Limited discussion of Real-Time Pricing “future research” (e.g., impact of uncertainty, volatility, and price spikes - hedging mechanisms)

# Comments and Suggestions

Studies focus solely on the variable component of retail pricing in isolation

**Moving Target:** Movement towards decoupling into fixed-variable designs

- Decoupling: reduce utility resistance to energy efficiency and recovery of fixed cost due to Distributed Generation under net metering
- Significantly reduces variable rates - dampens financial incentives
- Anecdotal evidence: “a lot of effort for minimal bill reductions”
- Increases importance of behavior incentives coupled with financial incentives in these regions (limit inattention) and automation

# Demand-Side Management Future Research Topics

- 1 How does the overall retail rate design structure impact the consumer's degree of price-responsiveness?
- 2 Impact of Residential Maximum Demand-Charges on Reducing Peak Consumption (single study on industrial loads in the 1980s)
- 3 Persistence of non-monetary incentives in motivating price-responsiveness (compared to financial incentives)
- 4 "No Silver Bullet" - performance of multiple policies (DR, DG, EE)
- 5 Environmental impacts of price-based DR (load shifting effects)

# Demand-Side Management in Alberta

Smart meters widely deployed for industrial and large commercial customers (limited residential)

Limited formal price-based demand response markets and residential time-varying prices

Evidence that large loads do respond to market prices (e.g., indicates potential for more formal Demand Response market (Brattle (2011))

System-wide smart meter implementation and time-varying prices in Alberta?

# Demand-Side Management in Alberta

AUC Smart Grid Study (2011) - Cost and Benefits of Smart Tech.

Literature Suggests large potential Benefits to Time-Varying Pricing

Price-Volatility in Alberta, handle intermittency (Wind), and market power/spikes

## Issues:

- 1 Flat load duration curve limits peak and off-peak differential (Ahmad Faruqui - Arc of Price-Responsiveness);
- 2 small residential Load; and
- 3 residential deployment of smart meters is costly.

**Summary:** More detailed DSM analysis is needed in Alberta using the tools summarized in this study. (Pilot Programs with Randomization)