ABSTRACT
Advanced Metering Infrastructure (AMI) is an integrated system of smart meters, communication networks, and data management systems that enables two-way communication between utilities and customers. This technology is intended to improve efficiency, identify and respond to outages more efficiently, and better monitor and control the distribution system. The only way to see the benefits of this technology is to engage with the new features it provides. This analysis highlights the strengths and weaknesses of AMI from the consumer perspective for marketing purposes for the City of Columbus as an extension of the Smart Columbus initiatives in order to capitalize on positive sustainable behavior change.

Background
AMI deployment in Columbus will be a part of a follow up to AEP’s gridSMART phase 1 demonstration project which has provided AMI to over 130,000 customers. In addition to smart meters, AMI uses Volt Var Optimization (VVO) and Distribution Automation Circuit Reconfiguration (DARC). VVO controls and monitors voltage levels on circuits leading to improved efficiencies while distributing energy to consumers. DARC allows for the reouting of power potentially saving significant time where otherwise consumers may be out of power. AEP Ohio has conducted a thorough report on the results of this project, indicating approximately 3% energy consumption reduction across the board.

Negative Perception
• Bill Increases
• Health Risks
• Fire
• Cyber Security
• Big Brother

Behavioral Science

1. Intentions
2. Perceived Control
3. Attitudes
4. Value Orientation
5. Awareness
6. Social Norms

Consumption Change & Cost Savings

Projection for the Columbus Area
Average annual savings from adopting AMI and engaging in consumer programs:

23.52% ~ $239.21

Customer Programs
• eView
  • Consumer usage feedback in real-time
  • SMART Shift Plus
  • Two-tier time-of-day (off/peak)
  • Three-tier time-of-day with critical peak pricing events
  • SMART Cooling (Plus)
  • Direct load control, thermostat only
  • Direct load control with load control switch
  • SMART Choice
  • Realtime pricing with double auction
  • Standard Residential
  • Flat tariff with declining block rate, average cost

Conclusions
1. AEP has excellent consumer programs that engage their customers with the benefits of AMI technology in accordance to energy use behavior theories identified by behavioral science research. In conjunction with CDP, the City of Columbus should use AEP’s customer programs as the foundation of engaging citizens with AMI.

2. Greater emphasis should be taken on the demographic differences of Columbus communities. Accurate data on income, consumption, and bills should be used to better understand the value orientation, expected utility, and other consumer attributes to influence consumer behavior change among different groups.

3. Perceived Control is a factor that has had little attention as far as addressing negative perception. In order to calm the fears of “Big Brother”, future efforts must focus on similar themes to highlight the benefits of connectivity rather than the misconception of being watched. Greater emphasis should be put on the empowerment of the consumer’s abilities with this technology to overcome this insecurity.

4. AMI deployment must continually consider negative perception that may be heightened by media at any given time. It is important to remind consumers that fire and cyber risks are being monitored. Explanations to questions of health risks and bill increases should be developed in accordance to the established energy use behavior influences.