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Perspectives

Consumer perceptions of electric utilities: Insights from the Center for Analytics Research & Education Project in the United States

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ABSTRACT

The Environmental Protection Agency's Clean Power Plan calls for government entities, business organizations and citizen groups to reduce use of "dirty energy" and related carbon pollution. Peak power consumption is associated with dirty energy sources. The Center for Analytics Research & Education (CARE) at Appalachian State University in Boone, North Carolina, is developing predictive models for peak energy spikes, so that corrective action can reduce power use. This study supports the CARE initiative and explores consumer perception of power providers. Results allow practitioners to influence peak power use reduction through targeted messaging in marketing and promotions campaigns. Factor analysis revealed the psychological dimensions "Good Citizen," "Detrimental Citizen," "Corporate Machine" and "Environmental Partner." A 9-item Perception of Power Provider Scale was introduced. Correlated items with the greatest effect size were "My power company provides a bill for services that is easy to understand" with "I am pleased with the customer service provided by my power company." It is suggested that power providers partner with university researchers to develop proprietary social science research. Results can be framed to craft a communication agenda that resonates with target customer groups. Developing a narrative that originates in a psychological understanding of consumer perception can affect change.

1. Introduction

Peak power usage and related "dirty energy" are of national concern. President Barack Obama reflected a heightened awareness of this issue when he presented the Environmental Protection Agency's Clean Power Plan [1]. A major initiative prompted an increased focus and effort to reduce use of dirty energy and further reduction of carbon pollution. The Clean Power Plan led to new U.S. standards to control dirty power emissions from power plants.

Some sources of dirty energy are clandestine in nature. Dirty energy can be generated through electrical pollution, stray voltage due to poor grounding, and utility infrastructure. High frequency noise originates from facility wiring and electrical devices in home and businesses. A related source of dirty energy is contained in electric and magnetic fields (EMF), which are emitted through any device powered by electricity [2]. Internet use has also been reported as contributing to dirty energy carbon emissions, due to thousands of computer servers drawing electrical power. Data centers that drive Internet use are often located where less costly power is available, most often generated through coal and nuclear sources [3].

2. Affecting behavioral change

The large-scale dirty energy problem requires a change in behavior from government entities, corporations, and citizen consumers. In addition to federal and state regulations, persuasive marketing and messaging are required to prompt corrective action. Communication platforms are being tested, to determine which will carry messages that affect change. Moezzi and Janda [4] explored behavioral change and policy intervention through their "social potential" approach to curbing energy use. Social potential is a communication perspective that complements current initiatives such as technical and behavioral change concepts. The authors suggest that social and citizen engagement, building communities, and "middle actors" are potential contributors to good energy stewardship.

Parag and Janda [5] also focused on middle actor empowerment as part of the contribution to a lower carbon society. Middle actors can work from a "middle out" approach, which promotes agency and capacity. Power consumers are prompted to not only make free choices, but to act on the ability to make choices. Middle actors

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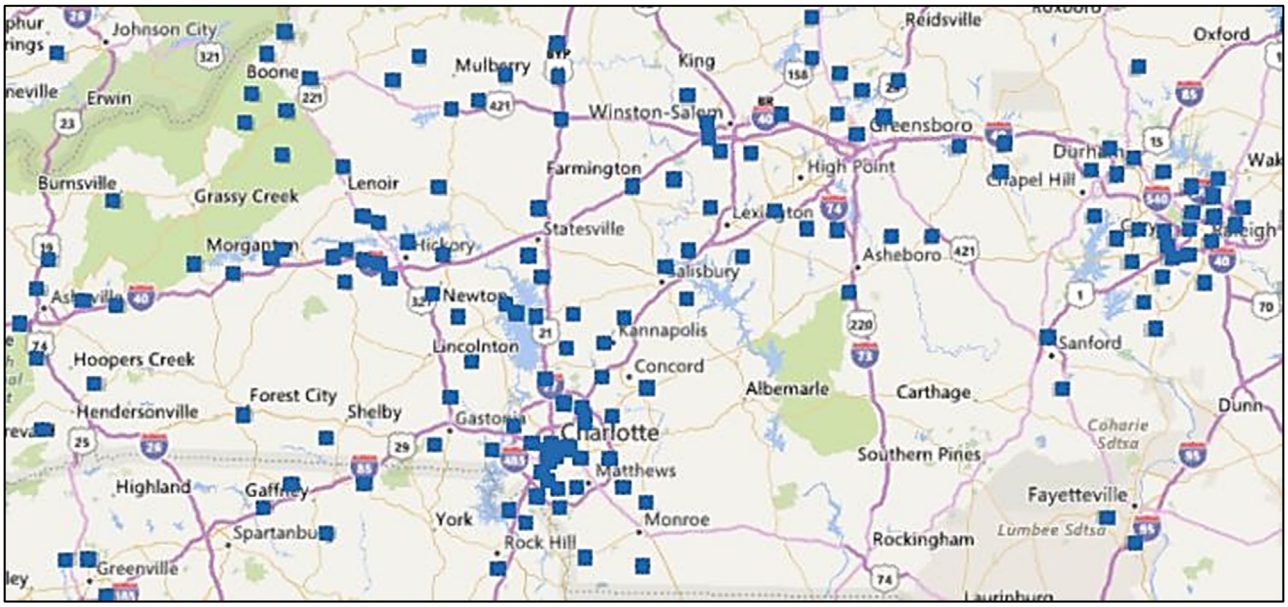

Fig. 1. Geographical data collection points for Perception of Power Providers study.

hold influence to affect change both above and below in a hierarchical sense, enabling and consolidating choices throughout the organization.

Behavior as related to energy reduction has been explicated specific to business power use. Current studies identified individuals within organizations, the organizations as entities, and external institutional forces. Areas identified as fruitful for future research included behavior at the individual, organizational and institutional levels, with cross-cultural comparisons [6]. The combination of perceptions among groups creates future opportunities for decision-making protocols. Other research related to the workplace applied the Theory of Planned Behavior in order to define attitudes, subjective norms and behavioral intentions [7]. A large sample set (N = 2919) indicated that sense of community was a predictor of self-supported behavior and behavioral intentions. This study suggests that approaching energy conservation should start with community based programs as a catalyst for success.

Huang et al. [8] suggested a connection between power companies and power consumers through Internet communication. This scenario would use Internet and social media connections to solicit citizens, urging them to opt in to smart grids that moderated power usage. Members of the opt-in network would participate in a peak power schedule that would reduce power consumption. Lower usage at peak times can reduce fuel costs to power providers and lower energy costs to network participants. Other studies suggest that decentralization of energy distribution, coupled with citizen participation, can become a priority in a peak power reduction initiative [9].

Other scholars have proposed a power use loyalty program, where consumers are prompted to improve energy practices based on incentives. Results indicated a strong initial start, but then a decrease in power reduction habits and in some cases an adverse rebound effect. Real time price incentives may be more effective. A pricing format that rewards consumers who have the highest reduction in peak power consumption would promote sustained interest and ongoing engagement [10].

3. University peak power initiative

It takes a collaborative effort to develop a local initiative to reduce peak power consumption. That challenge is underway at Appalachian State University's Center for Analytics Research & Education (CARE), which is housed in the Walker College of Business. A major project for CARE has been the development of predictive models that assist in peak energy reduction. The project is in conjunction with New River Light and Power (NRLP), the local energy provider to the university. Dr. Joseph Cazier, director of CARE, assembled a group including NRLP executives, data scientists, advanced analytics students, and faculty members who promote the CARE campaign and affect behavioral change. The working team's foundation is open collaboration. Students and faculty learn from each other. The discussion is lively. Documents and research summaries are freely shared and meetings are open interested parties.

The CARE project began with the development of predictive models, testing different iterations until models produced reliable projections for peak power days and times. When predictions with high probability of occurrence were documented, power providers and business customers could be alerted. Direct action with large business and state clients can reduce one portion of consumption. At Appalachian State, centrally controlled thermostat settings can be adjusted to support peak power reduction. A minor shift in building temperatures can reduce power consumption, which results in substantial savings for the university.

4. Defining consumer perception of power providers

In the next phase of the project, CARE will implement a communication plan with target messaging to the university population and surrounding power customer base. That prompted research to define the psychological behavior among power customers, through a perception of power providers study. What are customer perceptions and unique motivators that prompt behavior when customers think of their local power company?

The study was conducted though a university research course in the Communication Department at Appalachian State. The course was part of a distance education class for the advertising major. Twenty-six students in the course served as co-investigators. A methodology by Soh et al. [11] incorporated qualitative interviews, quantitative data collection, then statistical testing to reveal insights related to psychological perceptions.