Customer Analytics for Energy Efficiency

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ABSTRACT

Industry newsletters and webinars are abuzz with case studies, expert advice and pitches about customer analytics, big data and business intelligence. The movement to integrate and meaningfully interpret billions of data points is reaching beyond cutting edge utilities into the mainstream. This paper will explore the business case for and challenges to adoption of a customer analytics initiative proposed at Public Service Company of New Mexico (PNM).

The goal of the customer analytics initiative at PNM is to add value to the utility's energy efficiency programs by deploying predictive analytics in its energy efficiency programs. The project is intended to build on PNM's existing business intelligence capabilities and to integrate additional data and an analytic framework optimized for energy efficiency programs. The resulting capability will enable PNM to design programs and implement marketing campaigns that use enhanced knowledge of customers and targeting to recruit more participants, achieve deeper savings per participant, and lead to higher customer satisfaction.

This project will combine datasets already in operational use at PNM, but which are currently unlinked, with supplemental data from publicly available sources, including prior energy efficiency program participation, enrollment in other PNM programs and services, geographic data, customer equipment profiles, demographics, and psychographic customer segmentation categories.

There are significant technical, budgetary and project management challenges in undertaking the development and integration of strategic analytics. There are also organizational challenges in managing change, making decisions in a cooperative framework, and grounding project goals and strategies in the customer experience.

Background

Public Service Company of New Mexico (PNM), an electric investor-owned utility that serves 531,000 customers, is transitioning to the next generation of energy efficiency (EE) programs. These new offerings are based on developing better knowledge of customers through data analytics - the integration and synthesis of many types of data into a dynamic knowledge base. With better information about customers, PNM programs will be able to target and recruit participants more effectively and achieve greater engagement per participant.

These efforts are intended to help PNM meet its increasing regulatory requirements, as specified in New Mexico's energy efficiency resource standard. The Efficient Use of Energy Act of 2005 required PNM to achieve all cost-effective electric savings with two compliance milestones: 5 percent of 2005 total retail consumption in 2014, and 10 percent in 2020 (EUEA 2005). PNM initiated its energy efficiency programs in 2007, electric savings ramped up steadily over the next several years, and the utility met its 2014 compliance goal.

The EUEA was amended in 2013, setting the EE portfolio's funding level at 3 percent of customers' bills, lowering the 2020 compliance goal to 8 percent, and changing the primary cost-effectiveness test from the total resource cost test (TRC) to the utility cost test (UCT) (EUEA

2013). The UCT gave PNM more flexibility to try new technologies and market approaches, and the utility was able to restart programs it had been forced to cancel due to the lack of cost-effectiveness under the TRC, including an in-home audit/direct install program for existing homes and a new homes construction program[1].

While PNM's EE portfolio savings increased each year from 2007-2013, savings have become increasingly difficult to achieve in recent years (PNM 2016a). The technologies that led to fairly rapid escalation of savings after initial programs were launched are maturing and in some cases (such as compact fluorescent light bulbs) are losing ground in rapidly evolving markets and under ever more stringent codes and standards. In order to stay on track to meet the 2020 EUEA goals, the EE programs need to evolve to continue to capture cost-effective savings over the next five years. PNM will need additional average savings of nearly 69 GWh per year to achieve a cumulative savings goal of 658 GWh by 2020 (compared to the 2005 base year).

To meet its annual and cumulative goals, PNM will need to implement innovative energy efficiency programs that customers want to participate in. New program designs, new technologies and new incentive mechanisms are part of this evolution, as is a transition to a customer-focused business model.

The Current State of Knowledge about Customers

Our current knowledge about customers is sufficient to create program processes, establish incentive levels, develop marketing campaigns, and report on achievements. We combine data on participation, measures, consumption and savings, incentives, and other standard metrics to assess program performance. We measure customer satisfaction with programs through surveys. We compile anecdotal information from individual customers that comes from a variety of sources, including outreach engagements, site visits, and even complaints. Our knowledge of our customers is based on historic, tried and true, program management strategies and tactics. We can track information about individual customers through traditional program tracking mechanisms.

What we cannot yet do is 1) predict which customers will be most interested in participating in the future, 2) market directly to customers on the basis of our understanding of their needs and preferences, 3) track the success of direct marketing campaigns in encouraging customer participation, or 4) measure changes in customer satisfaction as a result of our targeted communications and their subsequent program participation. The customer analytics initiative will increase our ability to know our customers, communicate effectively with them, and measure the outcomes from these changes in approach.

Building Customer Engagement through Analytics

PNM needs to achieve robust levels of new savings from its energy efficiency programs over the next several years by getting more customers to participate in efficiency programs and/or achieving greater savings per participant. Mass marketing will probably not be able to stimulate the breadth or depth of customer engagement needed in the future, but a more direct

[1] The New Homes program is proposed in the 2017 Energy Efficiency Plan (PNM 2016b).

and personalized approach has great promise. In order for such an approach to be effective, we need to understand our customers better, which we can do by building a knowledge base that can be mined for actionable insights.

Several U.S. utilities are developing integrated analytics capabilities in order to find and serve customers with a more systematic and targeted approach. Eversource, PG&E, the Energy Trust of Oregon, Ameren Missouri, Kansas City Power & Light, and others have presented strategies and early results in the last two years (Phillips 2015; Davis 2015; Opinion Dynamics 2009; SGCC 2014). In general, these utilities are facing similar challenges as PNM – maturing programs in increasingly saturated markets, a desire to bring better data and analytics capabilities into their planning and implementation, and a recognition that improved customer analytics is a key factor in the transition towards a more customer-centric business model (Du Bois 2014; Potter 2015; Rominger and DeHenau 2015; Van de Grift, Dougherty and Marquis 2014).

Although some utilities have made significant progress in understanding fairly complex interactions between technology, information and behavior, there are still many holes in industry knowledge about how to create and maintain systems that meet core objectives of delivering energy and peak savings, while also enhancing customers' experiences and impressions of their utilities.

Advanced metering infrastructure (AMI) is beginning to create increasing opportunities for utilities to understand how their customers are using energy, and how they could benefit from EE or demand response programs (Caric 2015). PNM does not currently have AMI technology, but in February 2016, it filed for regulatory approval of AMI deployment, which it proposed to have completed by the end of 2019 (NMPRC 2016). Although PNM's primary goal in deploying AMI is to achieve increased operational efficiencies, it also recognizes that in the future, PNM may be able to offer a wider range of EE or demand response programs with this technology in place.

PNM is learning from early adopter utilities about how to build a customer analytics platform that is robust, reliable, flexible and scalable; that delivers on today's EE obligations and that can provide ongoing value in tomorrow's uncertain business and regulatory environment; and that uses customer analytics to inform what is being offered and how those offers are communicated.

PNM has filed to launch a customer analytics initiative in 2017 (PNM 2016b). The New Mexico Public Regulation Commission will consider the case and is expected to issue its determination in late 2016. Based on this time frame, PNM is hopeful for an official launch of the initiative in January 2017.

Customer Analytics Initiative Goals

The purpose of the customer analytics initiative is to develop more effective strategies to market energy efficiency programs to potential participants. An analytics-based approach will help identify customers who can benefit most from relevant services and incentives, and is expected to increase customer participation rates. It will also support transition of marketing strategies, with more focus on direct mail/email and neighborhood-based campaigns, which is expected to be more cost-effective than media advertising.

The strategic goal for the customer analytics initiative is to build the internal capability at PNM to support:

- Offering enhanced products and services that provide cost-effective savings for the energy efficiency portfolio;
- Targeting marketing & communications to maximize relevance to customers;
- Knowing our customers better, and meeting their evolving expectations;
- Building stronger customer relationships; and
- Enhancing customer satisfaction, loyalty and retention.

PNM's customer analytics initiative will employ greater use of customer data to shape the design, implementation and marketing of the utility's energy efficiency programs. The project will build on PNM's existing business intelligence capabilities; integrating additional customer data and developing a consistent analytic framework. The resulting capability will enable PNM to design programs, messaging and marketing campaigns that use greater knowledge of customers and targeting approaches to recruit greater numbers of participants, achieve deeper savings per participant, and lead to higher customer satisfaction.

Data will be extracted from official systems of record in operational use at PNM that are currently unlinked. The data extracts will be downloaded into a business intelligence platform and updated regularly. Additional supplemental data from publicly available sources will be added.

Initiative Plan

The customer analytics initiative will build on systems and tools already available within PNM and will supplement with additional data and tools as needed. PNM has already implemented a business intelligence platform to support certain customer service functions, such as determining tax districts or optimizing meter-reading routes. The tool is robust and flexible enough to accommodate this new initiative.

Several components are necessary to create a useful tool for program design, marketing and communication. The fundamental structure of the initiative is based on customer level data, a bottom-up approach. While data will be aggregated and statistically analyzed, the end result will produce lists of targeted customers to whom the EE programs should market their services and incentives. Data will also be useful for top-down analyses, and will provide metrics for measuring success and providing insights that will feed back into program design and refinement.

Analytics Strategy

As customer data are assembled into a business intelligence platform, an analytics plan will be developed on a program-by-program basis. Some programs will benefit from a straightforward cross-tabulation of relevant variables (such as identifying customers who live in areas with homes built during the 1970s when electric heating was popular), while others will get the greatest market lift from a more sophisticated analysis based on more granular data and multivariate regression models.

The first step will identify and explore basic parameters that affect participation using software tools for data exploration and visualization. Examples include identifying regions where customers are underserved, or identifying groups of customers with older equipment that would most likely benefit from efficiency upgrades.

A structured analysis will follow, to identify factors that may interact, and which can lead to more effective targeting of customers. For example, the analysis could identify residential customers who have high energy use, electric heating, and who are low income. Or, the analysis could identify small businesses that have high potential for energy upgrades, but are in areas that are underserved, or that are difficult to reach through existing trade ally sales efforts.

PNM or its program management contractors will develop analytic algorithms to identify targeted marketing opportunities. In some cases, the analysis will identify and target geographic areas or customer segments for outreach. In other cases, analysis will produce a calculated metric for likelihood to participate, or a propensity score, and the program will market directly to those customers with high scores.

Data Elements

Existing data will be compiled from several areas of the business, including prior energy efficiency program participation, electric usage history, geo-coded parcel data, customer equipment profiles, customer demographics, and history of participation in other PNM programs and services, such as customer-sited solar, budget billing, etc. New data will be added over time, including assessors' data and psychographic segmentation categories. Initially, PNM will purchase publicly available data on households, and over time will supplement it and improve its quality with data gathered directly from customers through online or onsite energy assessments or surveys.

Customer Segmentation

A customer segmentation study is planned for 2017 that will sample residential customers, conduct telephone surveys, and develop a manageable number of customer segmentation categories based on customers' values, preferences, and lifestyles. In the second phase of this project, statistical analysis based on relevant variables will be done for all residential customers, and where possible, customers will be assigned to segmentation categories. Other utilities doing this work have found that they were able to categorize a substantial portion of their customers with this approach (SGCC 2015; Moss and Cubed 2009). PNM will continue to supplement household data, periodically review these categories, and re-run analyses to segment additional customers whose profiles did not provide enough information to categorize them initially.

Program Analytics Pilots

In two PNM pilots, program management contractors are implementing analytics projects to support their marketing efforts. The Home Energy Checkup program is an onsite energy assessment and direct install program for residential customers. The program management contractor is developing propensity scores for customers based on customer and household data, and will market to individual customers with high scores. Using several variables relating to customer and housing characteristics, the contractor developed a logistic regression model that produced a probability score for each customer. Validation of the model with previous program participants found that customers with propensity model scores in the top 20 percent were more than 3 times more likely to become program participants compared to a random sample of

potential participants, and those in the top 5 percent were nearly 11 times more likely to participate (Hillman 2016).

PNM's QuickSaver program is a direct install program for small to medium-sized businesses. The program management contractor has identified areas by zip code where there is a high density of program eligible customers, but where the program has completed few projects over the last three years. This analysis will produce geographically concentrated lists of customers eligible for QuickSaver but who have not yet participated, and the contractor will market the program directly to customers.

Marketing EE Programs

Customer analytics will directly impact marketing for efficiency programs, supporting marketing plans, campaigns, strategies and tactics. As insights are collected over time, PNM will develop multi-channel communications to maximize individual relevance for customers. PNM and its program management contractors will develop and test messages developed specifically for each customer segment; will market to target customer segments; and will compare the effectiveness of different approaches.

Each program will develop messages that are concrete, personalized and actionable, and will deliver those messages through a variety of media, including in person, email, direct mail, social media and PNM's website customer portal. Customers will be encouraged to do an online energy assessment or an on-site assessment (which may include direct install efficiency measures). These channels can provide more reliable data about customers and their energy profiles, and can also be used to promote other relevant services and incentives.

PNM will continue to enhance its website, including developing single sign-on functionality that will enable customers to access all of PNM's services with one log on in a fairly seamless experience. As our ability to target programs, products and messages increases, we will decrease emphasis and budget for mass marketing, and shift to targeted marketing and an increased use of social media.

Evaluation, Measurement and Verification (EM&V)

As lessons are learned about the effectiveness of analytics-based targeted marketing, they will be incorporated across PNM's portfolio where benefits of this approach are likely to net positive outcomes. For each use case, we will do a preliminary qualitative assessment of the value of the information gleaned from analytics compared to the resources needed to get that information, and where the value is perceived to be greater than the cost, we will layer analytics into the program delivery model. We will also build into each program that uses analytics-based marketing an evaluation methodology to measure the impacts on program participation, savings and cost-effectiveness.

Over time, targeted marketing based on analytics is expected to increase program participation, increase the number of measures implemented, improve customer satisfaction, and ultimately lead to greater program savings and cost-effectiveness. The initial investment in building the system will be compared to costs for current marketing approaches, with key metrics being the cost of customer acquisition, the number of participants for each program compared year over year, the average number of measures installed by targeted customers or

cross-program participation, and customer satisfaction metrics. PNM will work cooperatively with the Commission appointed Independent Evaluator to develop an appropriate evaluation methodology.

Current Initiative Activities and Accomplishments

While regulatory approval is required before the customer analytics initiative can be officially launched, research and planning activities are underway to facilitate a smooth launch in 2017. The project team is researching other utilities managing customer-focused analytics efforts to learn from their experiences. The information technology team is researching and comparing analytic tools, and conducting structured planning to develop a flexible and robust data structure. Internal presentations and discussions are ongoing to inform and socialize the changes and opportunities expected to emerge from implementation.

Early Lessons Learned

Analytics Supports Customer Satisfaction

Findings from utilities across the country have demonstrated that customer satisfaction increases as customers become more aware of the energy efficiency programs offered by their utilities even if they haven't participated in those programs (Smith 2014; SEE Action 2011). In a recent survey of utility customers,[2] three quarters reported that more tailored information would be helpful to them, and 80 percent would view an online tool with information about energy use (Nicholls 2016). Analytics supports better EE program design and marketing, which is expected to lead to higher customer satisfaction.

Analytics results can also be provided directly to customers who are hungry for personalized information. Relevant data presented in clear and visually compelling ways can increase customer satisfaction on its own. PNM already provides basic information to customers on their energy use through an account portal on its website. As reporting capabilities mature during initiative implementation, PNM is planning to enhance the portal by adding detailed reports and graphs showing energy use, a breakdown of end uses, and how particular programs can benefit customers.

Energy Efficiency is a Driver for Utility Analytics

In a recent survey by the Utility Analytics Institute, utility representatives were asked to rate the importance of different customer analytics focus areas (Utility Analytics Institute 2015). Not surprisingly, meter data analytics and credit and collections topped the list in terms of importance. Perhaps somewhat surprisingly, energy efficiency programs ranked as the third most important focus area for customer analytics. Energy efficiency programs can be a strong driver for moving analytics strategies and investments forward at utilities.

The customer analytics initiative will help build awareness and participation in PNM's energy efficiency programs, improving portfolio impact and cost-effectiveness. The initiative

[2] The survey was conducted by KSV in Q1 2016 with 1,500 utility customers.

may also serve as a role model for how to use customer analytics to create more positive and relevant relationships with customers and to advance an integrated approach to managing the entire spectrum of customer touch points.

Managing Change

There is a significant opportunity to leverage the EE customer analytics initiative in departments responsible for supporting or promoting efficiency and load management programs, including customer service, marketing, account management, information technology and communications. This has already resulted in a more collaborative approach that crosses over departmental silos, leading to more effective program implementation, a heightened focus on customer experience, and enhanced esprit de corp.

Internal departmental silos manifest themselves as barriers to sharing information about customers, including lessons learned, plans, data and results. Change management strategies can be used to create collaborative opportunities that result in benefits across departments.

A cross-departmental advisory group was launched in 2015 to provide strategic input on planning and implementation for the customer analytics initiative. Advisory group members are managers who represent stakeholder departments within PNM, including EE design, EE program operations, customer service, business intelligence, marketing, branding, product development, load forecasting, distribution planning, information technology, and geographic information systems. One of the shared benefits of the group is the opportunity to communicate and harmonize planning among departments, particularly in the areas of capital infrastructure investment in data and analytics capabilities.

A much larger internal stakeholder group was also formed in 2015, which is a less formal vehicle to share information about customer analytics and how PNM and other utilities are instituting analytics strategies and customer-focused efforts. Stakeholders convene quarterly for demonstrations, presentations, and town hall meetings. The group uses standard data sharing products, including an intranet, to disseminate a variety of resources, including plans, guidelines, and references from other utilities and industry organizations.

The Role of Consultants

While PNM is working to develop an internal analytics capability, we recognize that analytics is a growth area for energy efficiency contractors and consultants. PNM has committed to testing approaches that use analytics to boost program performance, and supports program management contractors that have developed such services. Consultants offer many valuable capabilities in this pioneering work, including specialized expertise and relevant experience.

We have found certain drawbacks in the third party model, however. If each contractor develops its own strategy for the program or portfolio it is managing, PNM may face a potentially incompatible mix of analytic approaches, tools and outcomes. Certain contractors have proposed managing analytics for PNM's entire portfolio, but this can create issues around the sharing of proprietary information between competing companies. Also, when a consultant's contract expires, often so does the utility's access to specific data, analytic capabilities or algorithms developed by the consultant.

As a long-term strategy, PNM has the goal of developing internal capabilities to explore, analyze and visualize data, and also to develop algorithms that identify high usage customers,

produce propensity scores, or meet other as yet unknown analytic needs that will support EE program enhancement and cost-effective savings. The analytics infrastructure developed for EE may also leverage enterprise-level efforts to evolve towards a more customer-centric business model. As customer analytics matures as a field, hopefully there will consultants interested in supporting utilities that want to build their own customer-focused data platforms, as well as those that are more interested in third party management.

Summary

Customer analytics is a critical element in the next generation of energy efficiency portfolios. The systematic application of customer analytics can enhance the reach and effectiveness of EE programs. It can transform the scattershot marketing approach of the past into one that offers more relevant services and incentives to customers who are more likely to participate and benefit. By directly providing actionable information, utilities will increase satisfaction among their customers, and will help customers see their utility as a trusted energy advisor. The use of analytics can transform the efficiency challenge of 'disappearing low hanging fruit' into a customer-focused paradigm that opens a new world of opportunity and success to energy efficiency practitioners.

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