

# Business & Technology Report

OCTOBER 2018

## Customer Engagement Technology

Using Data-Driven Insights to Improve  
Cooperative Member Engagement

Prepared by: Peter May-Ostendorp, Ph.D., Katherine Dayem, Ph.D.,  
Catherine Mercier, LEED AP, Xergy Consulting  
Laura Moorefield, Moorefield Research & Consulting

This Report is owned by the National Rural Electric Cooperative Association (NRECA), with authorship contributions from GDS Associates, Inc.

For more information about this Report, please contact: Brian Sloboda, [brian.sloboda@nreca.coop](mailto:brian.sloboda@nreca.coop).

---

### Disclaimers

The information in this report is intended to be a helpful and educational resource that is general in nature. The information is not an exhaustive and complete examination of issues relating to deployment of customer engagement technologies. NRECA and the authors are not attempting to render specific legal or other professional advice in this report. We, therefore, encourage cooperatives to consult with qualified experts when undergoing any analysis of deployment of any of these technologies within your system. This report is provided “as is” and NRECA and the authors make no warranties or representations, either express or implied, about the information contained in the manual, including warranties of accuracy, completeness or usefulness. In addition, the authors and NRECA make no warranty or representation that the use of these contents does not infringe on privately held rights.

Readers are reminded to perform due diligence in applying these findings to their specific needs, as it is not possible for NRECA to have sufficient understanding of any specific situation to ensure applicability of the findings in all cases. Neither the authors nor NRECA assume liability for how readers may use, interpret, or apply this information or with respect to the use of, or damages resulting from the use of, this information. NRECA is committed to complying fully with all applicable federal and state antitrust laws. NRECA and the authors are not endorsing any particular vendor or technology featured in this report and not suggesting that deployment of any particular technology is appropriate for every cooperative. Electric cooperatives are: (1) independent entities; (2) governed by independent boards of directors; and (3) affected by different member, financial, legal, political, policy, operational, and other considerations. For these reasons, each electric cooperative should make its own business decisions on whether and how to use this information and which options are appropriate for that cooperative’s own circumstances.

---

This work product constitutes the intellectual property of NRECA and its licensors and, as such, it must be used in accordance with the license rights set forth below.

NRECA grants to NRECA voting members, their employees, directors, officers, and consultants who are acting on behalf of each NRECA voting member the right to access, use, download, share, and distribute for noncommercial purposes this report internally within such NRECA voting member company or on its behalf at no charge and without NRECA’s prior written approval. Voting members authorized to distribute this report shall include the following language on each page of the footer of every document used:

*Shared with permission from the NRECA. National Rural Electric Cooperative Association © 2018.  
All Rights Reserved. This material is confidential and is only permitted to be shared internally.*

---

Linking back to the report on [cooperative.com](http://cooperative.com) can be done without prior notice or additional permission from NRECA.

# Table of Contents

<b>EXECUTIVE SUMMARY</b> .....	<b>v</b>
<b>SECTION 1 INTRODUCTION</b> .....	<b>1</b>
What is Customer Engagement?.....	1
Why Customer Engagement and Why Now?.....	1
The Challenges and Promise of Data-Driven Engagement.....	2
<b>SECTION 2 A TOUR OF THE CUSTOMER ENGAGEMENT LANDSCAPE</b> .....	<b>4</b>
Drivers for Customer Engagement Technology.....	4
Market Snapshot.....	5
How Do Customer Engagement Technologies Work?.....	6
<b>SECTION 3 HOW ARE COOPERATIVES AND UTILITIES USING CUSTOMER ENGAGEMENT TECHNOLOGIES?</b> .....	<b>8</b>
Advanced Marketing.....	8
Program Design and Optimization.....	9
Enhanced Member Service.....	10
Energy Feedback and Behavioral Efficiency.....	13
Device Integration and Home Energy Management.....	16
<b>SECTION 4 OVERCOMING BARRIERS TO CUSTOMER ENGAGEMENT TECHNOLOGY</b> .....	<b>18</b>
Privacy.....	18
Security.....	19
Perceived Co-op Roles and Risk Tolerance.....	19
Resource Limitations.....	19
Challenges from the Vendor Perspective.....	20
<b>SECTION 5 GETTING STARTED</b> .....	<b>21</b>
Know Your Members.....	21
Know Your Co-op’s Capabilities.....	21
Crawl, Walk, Run.....	21
Get to Scale with Shared Resources.....	22
<b>SECTION 6 IN-DEPTH CASE STUDIES</b> .....	<b>23</b>
A. DR Program Evaluation and Targeted Marketing.....	23
B. Peak Reduction: Member Engagement Drives Reduced Member Costs.....	25
C. Members Actively Curtailing Usage – Beat the Peak.....	27
D. Home Energy Reports: A Simple Way to Engage Members.....	28
E. E-Commerce Platforms: Simplifying the Rebate Process.....	29

**FIGURES**

Figure 2.1	The Data Pipeline for Customer Engagement Technologies.....	6
Figure 3.1	Demand Response Segmentation for Fort Collins Utilities.....	9
Figure 3.2	Jackson EMC Energy Marketplace.....	12
Figure 3.3	Example of a Social Comparison Dashboard .....	13
Figure 3.4	Personalized Messaging Alerting User of Potentially Higher Heating Use .....	14
Figure 3.5	Personalized Energy Report from Union Power Cooperative that Breaks Energy Spending into Several Common Usage Categories.....	14
Figure 3.6	Bidgely Dashboard with Virtual Metering of Household Energy Sources and Net Consumption from Grid .....	15
Figure 5.1	Customer Engagement Technologies Can Perform Tasks Ranging from Simple Descriptions to More Complex Capabilities that Predict Outcomes or Help Determine Which Actions to Take .....	22
Figure 6.1	CoServ Rush Hour Rewards Program Enrollments. ....	26

**TABLES**

Table 2.1	Types and Examples of Customer Engagement Technologies.....	5
Table 2.2	Customer Engagement Technologies and Their Benefits to Electric Cooperatives.....	6

## Acknowledgements

The authors would like to thank the following individuals who supported this work through interviews, data sharing, and thoughtful review:

- Chris C. Baker of Arizona Public Services
- Terri Bakken and Eddie Webster of Minnesota Valley Electric Cooperative
- Zack Baron of EnergySavvy
- Emily Beliveau, Crawford Frazer, Dominic May, and Judd Moritz of Simple Energy
- Amy Bryan of Jackson EMC
- Tara Collins, Nate Grahl, and Jeff Haase of Great River Energy
- Gary Franzen of CoServ Electric
- Mark Gately of Tendril
- Milton Geiger of Poudre Valley REA
- Amelinda Hendrickx of Lake Region Electric Cooperative
- Jim Musilek and Ajaz Sadiq of North Carolina EMC
- Emmett Romine of Powerley
- Ryan Rooney of Runestone Electric Association
- Bruce Sayler of Connexus Energy

## Terms and Abbreviations

AMI	Advanced Metering Infrastructure
BYOD	Bring Your Own Device
CIS	Customer Information System
CRM	Customer Relationship Management
DER	Distributed Energy Resources
DR	Demand Response
DRMS	Demand Response Management System
DSM	Demand-Side Management
EE	Energy Efficiency
GIS	Geographic Information System
IVR	Interactive Voice Response
MDMS	Meter Data Management System
NISC	National Information Solutions Cooperative
OMS	Outage Management System
PID	Personal Identification
PII	Personally Identifiable Information

## About the Authors

**Peter May-Ostendorp**, Ph.D., LEED AP O+M, Principal and Founder of Xergy Consulting

Dr. May-Ostendorp has been investigating emerging energy savings and distributed energy opportunities at the building-grid interface since 2004. He has authored dozens of publications on product efficiency, building controls, and smart systems; his research has led to mandatory efficiency standards, voluntary labeling programs, and utility efficiency programs. Peter utilizes his expertise in building systems, building energy modeling, controls, and energy data science to research, develop, and evaluate new clean energy technologies on behalf of diverse clients from the public and private sectors. He lives in the foothills of the San Juan Mountains with his wife and three children in Durango, Colo., and is a member of La Plata Electric Association.

**Katherine Dayem**, Ph.D., Principal, Xergy Consulting

Dr. Dayem helps U.S. and global clients investigate, analyze, and cultivate emerging clean energy resources at the grid's edge. Her research is focused on identifying impactful new ways to save energy, from product-level to building-level, and has resulted in deep energy savings through innovative utility programs and the enactment of energy-saving regulations. Katherine's recent work has delved into a wide range of topics, including load disaggregation, low-power modes of electronics and other end uses, and beneficial electrification. She lives in Durango, Colo., and is a member of La Plata Electric Association.

**Catherine Mercier**, LEED AP, Energy Scientist, Xergy Consulting

Ms. Mercier has been researching and analyzing energy-efficiency opportunities for electronics and appliances for more than 10 years. She leads and supports many projects related to non-intrusive load monitoring, home energy management technologies, computers, data centers, and standby power. Catherine excels at market and technical research, data analysis, and economic analysis; her work has been influential in the development of innovative market transformation programs and energy-efficiency policies for numerous clients. She lives in Ft. Collins, Colo.

## Executive Summary

*In America's increasingly service-oriented economy, the process of engaging and retaining customers has evolved into a science. Organizations now have access to large volumes of member data to improve how customers feel about a company or brand and to encourage them to act on those feelings. **Customer engagement** — the practice of deepening a person's cognitive, emotional, and behavioral connection with a brand or company — can pay dividends for organizations through increased customer satisfaction and loyalty.*

### **But how do co-ops improve engagement, and what tools are at their disposal?**

This report explores the latest developments in *customer engagement technology*, a broad category of products and services that apply analytics to member data to drive improved engagement. Technologies like these represent best practice in some of the most world's most innovative organizations, and consumers interact with them every day through brands like Amazon, Google, or, essentially, any other public-facing technology company. These organizations maintain high levels of engagement by using customer data to personalize services and motivate individuals to become more actively involved with their products.

The electric power industry, including cooperatives, has begun to embrace customer engagement technology and identify compelling uses that enhance marketing, program operations, and demand-side management programs.<sup>1</sup> The market is growing rapidly. Utility spending on customer engagement technology is already a \$3.6 billion industry and is expected to increase by more than 40% in the next decade,<sup>2</sup> driven by several trends, including customer preference for more personalized and convenient service platforms, broader adoption of customer-centric and service-based utility models, and opportunities to streamline customer interactions and reduce costs.

Cooperatives currently have a potentially overwhelming array of customer engagement technologies from which to choose. To simplify the landscape, this report organizes them into five core application areas:

- Advanced marketing,
- Program design and optimization,
- Enhanced member service,
- Energy feedback and behavioral efficiency, and
- Device integration and home energy management.

Each application can provide a variety of potential benefits to co-op staff as well as members (see [Table 2.2](#)), as demonstrated in case studies from leading cooperatives and utilities across the nation.

These technologies represent best practice in some of the most world's most innovative organizations.

Despite the various benefits of customer engagement technology, utilities and cooperatives still face significant challenges on the road to deployment; however, most of these obstacles can be mitigated with careful planning. Adopting best practices regarding the security and privacy of member information and providing transparent communication with members on the benefits of new technologies can help mitigate a host of acceptance issues.

Co-ops of all sizes can implement member-engagement technologies, but no one-size-fits-all solution exists. As a foundational step, co-ops must carefully consider their goals for – and the resources (both staff and financial) available to implement – such projects. For more advanced approaches, this includes taking inventory of in-house capabilities and identifying existing gaps, particularly when it comes to IT system administration. Small co-ops, for example, may simply not have the in-house resources to deploy third-party customer engagement solutions due to the level of collaboration required between co-op IT staff and third-party implementers. To meet their goals, co-ops with limited resources may consider pooling resources with other cooperatives through a generation and transmission co-op, for example.

But even co-ops with limited resources can still take steps to improve member engagement by starting simple and adopting a crawl-walk-run mentality when it comes to the adoption of customer engagement technology solutions. By starting with practical, no-regrets use cases, such as targeted marketing campaigns or personalized energy reports, staff can build a foundation for more advanced applications in the future.



## 1

## Introduction

### What is Customer Engagement?

**Customer engagement** is the practice of deepening an individual's cognitive, emotional, and behavioral connection with a brand or company.

**Customer engagement technologies** are the products and services that apply analytics to customer data to drive engagement.

Engaged members are more aware of and more likely to participate in the programs that co-ops provide.

Even for cooperatives, which tend to see above-average member satisfaction compared to investor-owned utilities,<sup>3</sup> deeper engagement with members makes a difference. Research by Touchstone Energy Cooperatives shows that, when stakeholders identify as members or owners in the co-op, their satisfaction scores are measurably higher than

those who merely identify as customers. Engaged members perceive their co-ops more favorably across a range of issues, from program offerings to service reliability. Engaged members are also more aware of and more likely to participate in the programs that co-ops provide.<sup>4</sup> It is in every co-op's interest to strive for high levels of engagement with members.

### Why Customer Engagement and Why Now?

Fundamental shifts in the electric power industry will require more than new energy technologies. Engaged members will play a key role in navigating these changes.<sup>5</sup> Stagnant load growth, coupled with competition from third parties and changing customer expectations, has led to a new, service-focused business model for the co-op and utility of the future. Rather than building their business models around generating, transmitting, and distributing electricity, many

electric providers are instead developing "consumer-centric" approaches, offering services enabled by electricity, such as keeping the refrigerator cold or the lights on, and resources that give consumers insight into and control over their electricity consumption, such as DR, EE, and distributed generation technologies.<sup>6,7</sup> By engaging members, co-ops will encourage loyalty and prevent members from buying services from competing providers.<sup>8</sup> However, co-ops must earn

this loyalty in newer service areas like renewable energy, where members are just as likely to look to the Internet as the co-op for information and services.<sup>9</sup>

At the same time, member service expectations are evolving, and many members are expecting more than a monthly bill from their electricity provider. They are becoming more proactive and expect

information and services to be delivered through multiple channels, available 24/7, similar to their experiences with other service providers.<sup>10</sup>

Finally, because the nature of electricity generation is changing, utilities may need greater monitoring and control capabilities at the edge of the grid and on the customer side of the meter.

As the penetration of renewable generation increases, utilities can balance the variable generation with flexible loads and storage. Recruiting the right participants for these next-generation programs will require co-ops to target the right members, in the right locations, and with the right distributed resources. Customer engagement technology can be used to meet this challenge as well.

## The Challenges and Promise of Data-Driven Engagement

Quite simply, most Americans do not have the time or interest to think about their energy providers, much less engage with them in meaningful ways.

The challenge for co-ops is to lower the barriers to entry, to make the member conversation effortless and compelling.

Electric cooperatives and utilities alike face significant challenges in trying to advance customer engagement. For one, electricity providers compete for scarce consumer attention. The average utility customer spends only six to nine minutes per year thinking about his energy use and interacting with his utility.<sup>11,12,13</sup> On the other hand, the typical American spends 20 minutes per day – 120 hours per year – on Facebook alone. Energy, electricity included, is also inexpensive: the average U.S. household spends less than 2% of its income on home energy bills, often less than on cellular phone or pay TV plans.<sup>14</sup> And, although the vast majority of Americans think saving electricity is a good idea, less than 7% of them have ever participated in an efficiency rebate program.<sup>15</sup>

Quite simply, most Americans do not have the time or interest to think about their energy providers, much less engage with them in meaningful ways. The challenge for co-ops is to lower the barriers to entry, to make the member conversation effortless and compelling, so that co-op programs and messaging can compete for this scarce time and attention. They can accomplish this by simplifying member interactions, making those interactions more personal, and proactively offering relevant and actionable information. Customer engagement technologies help accomplish all of this economically and at scale.

Fortunately, cooperatives have already made many of the necessary infrastructure investments to leverage customer engagement technology, through the rollout of advanced metering infrastructure (AMI), customer information systems (CIS), outage management systems (OMS), and other data assets. Separately, these are interesting pools of data, but, taken together and combined with new analytics, they can form a clearer picture of member behaviors, preferences, and energy use.

This data can also be used to optimize marketing and better match new products and services to member needs. More sophisticated analytics can help provide more accurate information to customers about power outages, grid updates, and repair work by field crews, all of which can raise customer satisfaction, a key component of customer engagement.<sup>16</sup>

# 2

## A Tour of the Customer Engagement Landscape

*This section outlines electric providers' motivations for implementing customer engagement technologies, describe today's landscape of available technologies, and provide a high-level primer on how they work.*

### Drivers for Customer Engagement Technology

A wide range of energy providers and third parties are looking to tap into data sources like AMI and other customer information to provide insights that can benefit utility and customer alike. Utility spending on customer engagement technology is already a \$3.6 billion industry and is expected to increase by more than 40% in the next decade.<sup>17</sup> This interest and growth is driven by several important electric sector trends:

- **Customer Interest.** Consumers in general are looking for services that are more personalized and allow management of their energy through digital tools.<sup>18</sup>
- **Digital Channels.** Digital channels are now essential for reaching customers. Nearly 8 out of every 10 co-op members prefer receiving communications from their co-op electronically. For urgent communications, such as updates on outage restoration efforts or alerts about high bills, members prefer email and text messages as much or more than phone calls.<sup>19</sup>
- **Good Satisfaction, but Room for Improvement on Engagement.** According to the latest 2017 American Customer Satisfaction Index benchmarks, co-ops garner slightly better satisfaction scores than investor-owned utilities.<sup>20</sup> However, Touchstone's 2016–2017 Cooperative Difference survey also highlights that co-ops receive a wide range of scores regarding engagement with their members, indicating that there can be significant room for co-ops to deepen member relationships.<sup>21</sup>
- **Customer-Centric Thinking.** Customer engagement technologies dovetail nicely with the broader trend toward customer-centric utility approaches. Customer engagement technology is a close relative of the customer-centric “design thinking” process, which allows businesses to develop products and services through empathy and collaboration with customers. Design thinking is a natural mechanism for cooperatives to understand “customer pain points” and create meaningful engagements that address them.

Nearly 8 out of every 10 co-op members prefer receiving communications from their co-op electronically.

- **Streamlining.** Customer engagement technologies can simultaneously improve customer satisfaction, streamline customer interactions, and reduce costs. For example, by maintaining oversight of its contractors and performing quality assurance with EnergySavvy's Program Optimization software, Arizona Public Service (APS) reduced the physical inspections of attics from 40% of all projects to 20%, lowering its inspection budget by 25%, while still delivering turnkey home retrofit services.

## Market Snapshot

Electric cooperatives can choose from a diverse array of customer engagement technologies. For example, in the arena of home energy management, which is just one mechanism for engaging residential customers, the Northeast Energy Efficiency Partnership (NEEP) currently lists more than 275 vendors as of this writing.<sup>22</sup> Table 2.1 summarizes the landscape of customer engagement technology solutions in five main categories, each containing applications and

use cases that are quite familiar. The categories presented are not exclusive; some solutions may fall into multiple categories.

Each application area for customer engagement also can deliver a unique set of benefits to cooperatives and their members. Section 3 discusses specific case studies, their results, benefits, and lessons learned. **Table 2.2** illustrates the types of benefits co-ops can reasonably achieve within each application area.

**TABLE 2.1: Types and Examples of Customer Engagement Technologies**

Technology Type	Description	Examples
Advanced marketing	Utilize analytics to segment co-op membership, allowing for more personalized communications	<ul style="list-style-type: none"> <li>• Segmentation and targeting</li> </ul>
Program design and optimization	Provide engagement or overall program effectiveness metrics for a given program or campaign; almost always integrated with customer-facing solutions	<ul style="list-style-type: none"> <li>• Program evaluation and optimization</li> <li>• Data-driven maintenance and fault detection</li> </ul>
Enhanced customer service	Enhance existing member services, such as phone support, using analytics	<ul style="list-style-type: none"> <li>• E-commerce</li> <li>• Call center support</li> <li>• Self-service</li> </ul>
Energy feedback and behavioral efficiency	Various forms of energy information feedback, including enhanced billing with neighbor comparisons, web and mobile energy dashboards, and more sophisticated load disaggregation technologies	<ul style="list-style-type: none"> <li>• Social comparisons and benchmarking</li> <li>• Bill forecasting and high bill alerts</li> <li>• Personalized savings tips and recommendations</li> <li>• Load disaggregation</li> <li>• Games and rewards</li> </ul>
Device integration and home energy management	Hardware-centric solutions that leverage emerging smart devices and HEM systems to keep members more engaged with their energy use and develop positive associations with the co-op; data from hardware can be integrated into advanced marketing techniques to speed program enrollment	<ul style="list-style-type: none"> <li>• Enhanced program enrollment</li> <li>• Bring-your-own-device programs</li> <li>• Building-grid integration through smart devices</li> <li>• Enhanced insights from smart devices</li> </ul>

**TABLE 2.2: Customer Engagement Technologies and Their Benefits to Electric Cooperatives**

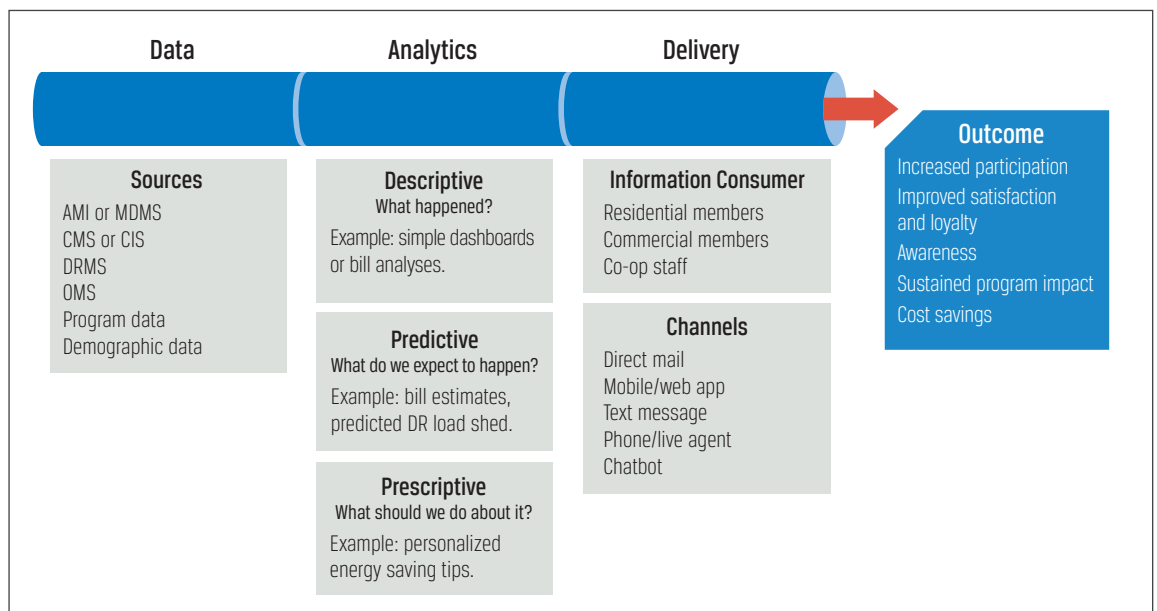
		Customer Engagement Technology Applications				
		Advanced Marketing	Program Design & Optimization	Enhanced Member Services	Energy Feedback & Behavioral Efficiency	Device Integration & Home Energy Management
Benefits	Reduce operating expense	•	•	•		
	Reduce staff burden	•	•	•		
	Increase program participation and performance	•	•	•	•	•
	Increase member awareness	•	•		•	•
	Increase member satisfaction			•	•	•
	Reduce bill shock and complaints			•	•	•
	Enhance grid management					•

### How Do Customer Engagement Technologies Work?

Despite the broad range of solutions on the market, all customer engagement technologies use the same basic three-step process – a customer engagement “information pipeline” – to convert data into actionable insights, then translate those insights into meaningful engagement opportunities for members (Figure 2.1).

#### STEP 1: DATA

Solutions must first collect, clean, and integrate customer data from a variety of potential sources, including AMI, CRM systems like Salesforce, CIS, program participation records, member demographics, operational data (DR or outage management systems [DRMS or OMS], for example), and even in-home devices.



**FIGURE 2.1: The Data Pipeline for Customer Engagement Technologies**

Customer engagement technologies can provide co-ops with a powerful tool to stay abreast of member expectations and deepen engagement and loyalty to the co-op.

## STEP 2: ANALYTICS

The crucial next step in the process is the application of analytics to data to produce metrics and insights that can be used by co-ops and members to drive engagement and actions. This is the main factor that separates customer engagement technologies from other traditional forms of customer engagement.

This step can be accomplished in countless ways, limited only by the creativity of the co-op or vendor. For example, an algorithm might develop scores or comparative metrics that allow customers to compare their consumption to those of similar homes. Load disaggregation techniques can be used to detect members with high potential for DR to target program communications. And naturally, analytics can then be applied to gauge program performance and engagement. These are but a few of the wide variety of analytics available today.

Analytics can vary significantly in their complexity and capabilities, and fall into three categories:

- **Descriptive Analytics** (*What happened?*): provides a clear view of what the underlying data means by summarizing it and extracting useful metrics or features.
- **Predictive Analytics** (*What do we expect to happen?*): builds on descriptive metrics by using the data to forecast future outcomes based on past events.
- **Prescriptive Analytics** (*What should we do about it?*): provides clear and actionable recommendations for customers based on the underlying descriptive or predictive results.

A descriptive dashboard, for example, might simply show a member's energy usage and bill, whereas a prescriptive dashboard might suggest specific actions a member could take to reduce periods of high demand.

## STEP 3: DELIVERY

Ultimately, even the most sophisticated analytics will be unable to impact engagement unless the resulting insights are clearly communicated. In the delivery step, insights are presented to various information "consumers," be they members or utility staff. Insights need not arrive in digital form, since different member segments may respond to different media. For example, retirement-age members may respond better to traditional print channels, whereas younger customers may prefer digital communications.<sup>23</sup> By enabling members to interact with their energy providers more easily using the communications channels they prefer, co-ops maximize their chances to connect.

If executed well, customer engagement technologies can provide co-ops with a powerful tool to stay abreast of member expectations and deepen engagement and loyalty to the co-op. Where do co-ops stand on the adoption of these technologies, and where is there room for further exploration? The next section explores use cases across the spectrum of customer engagement technologies.

By enabling members to interact with their energy providers more easily using the communications channels they prefer, co-ops maximize their chances to connect.



# 3

## How Are Cooperatives and Utilities Using Customer Engagement Technologies?

Targeted marketing begins with a segmentation analysis to identify groups of customers with certain characteristics based on demographics, usage patterns, or other data.

Customer engagement technology can manifest in a variety of ways in the electric business, many of them already familiar. A text message-based outage management system or a web-based dashboard that displays usage information are both easily recognizable forms of customer engagement technology.

Customer engagement technology can also disguise itself in more traditional forms. Many co-ops, for example, use bill stuffers to promote their latest energy-efficiency rebate programs. Many of those bill stuffers will reach households that have already participated in the programs or, more frequently, that *cannot* participate in a program because, for example, they use gas heat instead of electric.

With a few process upgrades, even bill stuffers could be a form of customer engagement. By leveraging customer data and advanced analytics, a co-op might be able to better target program opportunities to nonparticipants or those who stand to benefit the most, such as households with high bills.

This section looks in detail at various use cases for customer engagement technology among today's electric cooperatives and other electric providers. As before, we split customer engagement solutions into the five categories shown in Table 2.2 and provide key use cases for each of these categories. Customer engagement technologies are diverse in

type and effect and, therefore, the list is comprehensive but by no means exhaustive. There are no one-size-fits-all solutions in the customer engagement space; each use case depends on the unique needs of the co-op and its members. Although a number of co-op examples are included below, solutions being tested by larger investor-owned utilities are also highlighted to provide a more comprehensive view of current applications.

### Advanced Marketing

Advanced marketing use cases apply analytics to enhance the impact of marketing campaigns, usually with the end goal of increasing participation and enrollment in co-op services, such as energy-efficiency or demand-response programs.

#### TARGETING THE RIGHT MEMBERS WITH THE RIGHT OFFERS

Targeting recognizes that content, offers, and marketing messages are not one-size-fits-all. To maximize engagement with co-op offerings, marketing efforts should be directed to the most relevant members. Targeted marketing begins with a segmentation analysis to identify groups of customers with certain characteristics based on demographics, usage patterns, or other data. Co-ops can then target the right segment for their programs, enabling them to execute marketing campaigns rapidly and more cost-effectively.



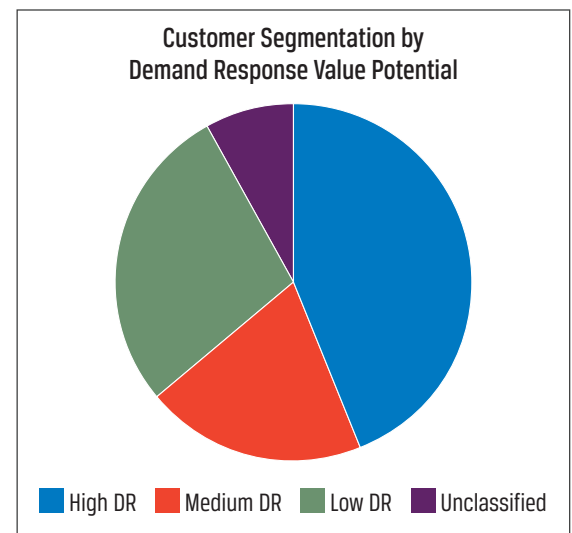
Targeting can derive insights about members from multiple data sources.

Targeting can derive insights about members from multiple data sources. For example, in January 2018, Minnesota-based Runestone Electric Association (REA) kicked off a demonstration project to leverage geographic data, member program enrollment status, and interval meter data to identify promising candidates for its heat pump and water heater DR programs. As a follow-on activity, REA is looking at combining results from its annual residential end-use survey to tighten its segmentation.

For Lake Region Electric Cooperative (LREC), a targeted recruitment approach led to improved program performance overall. Located in Pelican Rapids, Minnesota, LREC used a combination of AMI and basic customer metadata to target members that could most benefit from the co-op's smart thermostat demand-response program. According to Amelinda Hendrickx, Energy Services Engineer at LREC, "HVAC load reduction averaged 0.6 kW per customer, an improvement from the generally achieved 0.3–0.5 kW per customer." (See [Case Study A, "DR Program Evaluation and Targeted Marketing."](#))

Fort Collins, Colorado's municipal utility provides an excellent example of how cooperatives could design entire programs

using a targeted approach. The utility's Peak Partners program was developed through a segmentation analysis and estimate of demand response potential across the city's then 60,000 residential meters. About 26,000 customers were flagged as having high DR potential for both smart thermostat and water heater demand-response applications based on an analysis of AMI usage data (Figure 3.1). Program marketing efforts then targeted only these 26,000 accounts. Of these, nearly 10% (about 2,500) adopted smart thermostats and 5% (about 1,400) water heater load control switches.<sup>24</sup>



**FIGURE 3.1: Demand Response Segmentation for Fort Collins Utilities<sup>25</sup>**

## Program Design and Optimization

Cooperatives and utilities are also using analytics to provide a more quantified, data-driven view of overall program effectiveness, yielding metrics that can guide future refinements of program design.

### EVALUATING PERFORMANCE AND OPTIMIZING PROGRAM DESIGN

The partnership between Great River Energy – a Minnesota-based generation and transmission cooperative – and its member distribution cooperatives provides a great example of how data

and analytics can be used to optimize programs and operations.<sup>26</sup> Minnesota Valley Electric Cooperative (MVEC) and LREC have taken a data-driven approach to evaluating summertime demand response programs. Prior to their study, the co-ops generally assumed that AC compressor cycling led to about 1 kW of peak demand reduction per home. However, when compared against a control group of program nonparticipants, they found that actual peak reductions were much lower when accounting for

natural, random load fluctuations that occur in members' homes. This insight led to additional segmentation analysis of member load profiles, and the teams were able to better define homes with enhanced savings potential. (See [Case Study A, "DR Program Evaluation and Targeted Marketing."](#))

#### DATA-DRIVEN APPROACHES TO MANAGE VENDORS AND FAULTY EQUIPMENT

Analytics can also be used to troubleshoot issues with underperforming contractors or equipment installed as part of efficiency or DR programs. Arizona Public Service (APS) uses EnergySavvy's Program Optimization software to maintain oversight of its participating contractors and

perform quality assurance.<sup>27</sup> The software remotely monitors the performance of contractor installs through AMI data and combines this information with limited site inspections to provide a picture of overall contractor performance. Through this remote monitoring, APS reduced physical inspection of attics from 40% of all projects to 20%, lowering the inspection budget by about 25%.

Runestone Electric Association (REA) developed an in-house solution. By analyzing AMI data, staff were able to identify equipment that failed to respond to a DR event. (See [Case Study A, "DR Program Evaluation and Targeted Marketing."](#))

### Enhanced Member Service

This category ties together many activities that improve the member experience through strong services and support. This includes call-center support, e-commerce solutions, and self-service efforts.

#### INTEGRATED MEMBER INFORMATION TO SUPPORT CALL CENTERS

Although we see less of this activity among co-ops due to their size, call center applications illustrate the potential value of integrating data sources that might otherwise live in separate silos. Customer metadata and AMI usage history can be combined to better inform and personalize direct interactions (phone or in-person) with members.

CenterPoint Energy has sought to enhance customer engagement by improving its call center experience. To improve customers' personal interactions with customer support personnel, CenterPoint

Energy invested an integrated data platform that includes a predictive analytics engine (SAP's HANA platform). This allows CenterPoint's interactive voice response (IVR) and customer service personnel to be more informed, personalized, and proactive in addressing customers' needs. If a customer calls regarding a high bill, for instance, the system automatically informs the call center representative about the reason for the inquiry, as well as providing an automated list of energy management tips relevant to that customer's account.<sup>28</sup>

Other large utilities have implemented similar approaches. During the summer of

If a customer calls regarding a high bill, for instance, the system automatically informs the call center representative about the reason for the inquiry, as well as providing an automated list of energy management tips relevant to that customer's account.

2014, for example, Arizona Public Service (APS) launched a campaign to improve handling of customer complaints. APS adopted EnergySavvy's Optix Engage product to provide personalized low- or no-cost energy savings measures to customers calling with high bill complaints.<sup>29</sup> During the peak cooling season, the utility was able to engage 7,158 customers, leading to a 5% increase in satisfaction of APS customer service and a 14% increase in satisfaction related to conflict resolution, according to Chris Baker, APS program manager.

### E-COMMERCE

Some electric co-operatives and utilities have innovated on energy-efficiency rebate programs by using e-commerce marketplaces to offer products such as smart thermostats and other connected, energy-saving devices. These efforts are aimed at attracting what Accenture calls the "New Energy Consumer"—a tech-savvy, active energy customer who demands diverse, individualized, interconnected ways of using and even producing electricity—as well as other customers who prefer to make purchases on the Internet.

Through a marketplace, customers can get an instant online rebate for purchases of cooperative-marketed products and services that contribute to DR and efficiency objectives. Personalized recommendations increase conversions by suggesting relevant products to purchase. Because less than 7% of customers make use of utility rebates,<sup>30</sup> e-commerce solutions have the potential to expand the reach of these rebates by streamlining the rebate process.

These services are not without implementation challenges. The marketplace must be customized to each utility or co-op's rebate programs, which incurs a certain cost that could be a hurdle for small co-ops.

As with all engagement solutions, the potential benefits should be weighed against implementation costs. In addition, particularly in small communities, drawing members to purchasing equipment online may negatively impact retailers in the area.

Because less than 7% of customers make use of utility rebates, e-commerce solutions have the potential to expand the reach of these rebates by streamlining the rebate process.

Leading vendors of such marketplaces include Simple Energy, Opower, and Enervee. Solutions have been implemented by more than 50 larger investor-owned utilities across the country, from Consolidated Edison in New York to San Diego Gas and Electric in California.<sup>31</sup> Two electric cooperatives have recently launched their own marketplaces using Simple Energy's platform. The G&T co-op Great River Energy offers the service to its distribution co-op members, while distribution co-op Jackson Electric Membership Corporation (EMC) offers it directly to its members.

Great River Energy's EnergyWise MN Store features integrated instant rebates on smart home and energy-efficiency products. Members can validate their eligibility for rebates, purchase, and redeem their rebates on products like LED lighting, Wi-Fi thermostats, smart home products, and water-saving products.

"We wanted to make it easy and affordable for cooperative members to make significant changes that can greatly increase their energy-efficiency and comfort," said Tara Collins, Senior Marketing Specialist, of Great River

As with all engagement solutions, the potential benefits should be weighed against implementation costs.

Energy. At the time of this writing, the project was still in an early phase, and challenges and benefits were not available for discussion.

In August 2017, Jackson EMC, a relatively large distribution cooperative that serves 227,000 members in northeast Georgia, launched the Jackson EMC Marketplace (Figure 3.2). Their roll-out process and initial months of offering the platform have been positive. (See [Case Study E, “E-Commerce Platforms: Simplifying the Rebate Process.”](#))

### SELF-SERVICE

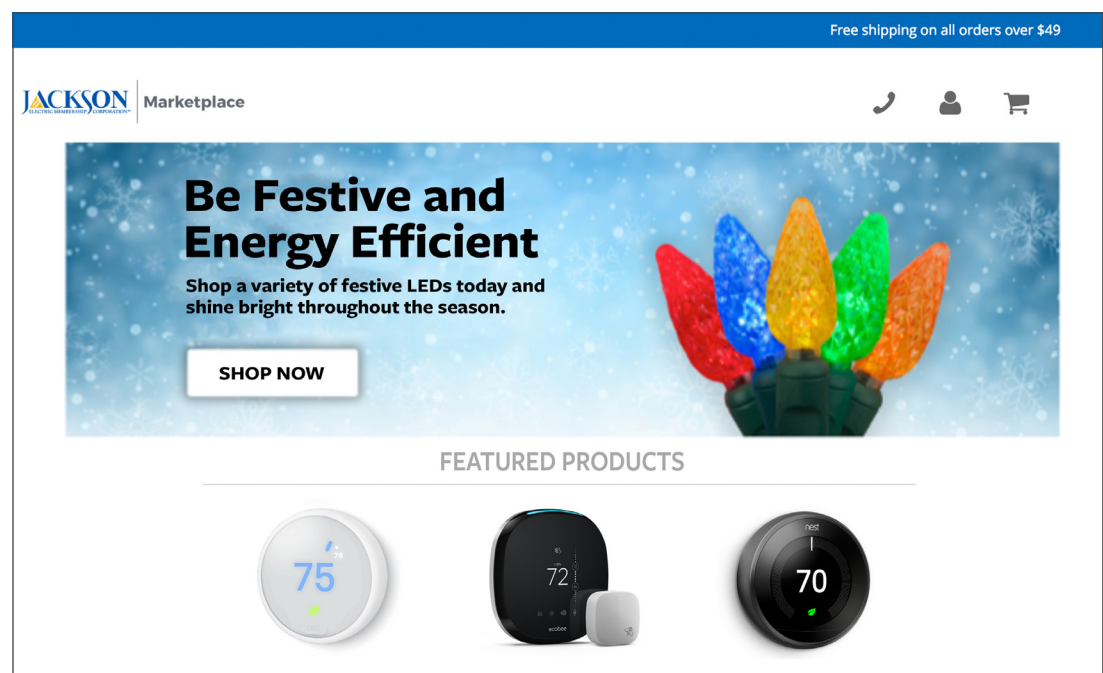
Self-service can include options such as outage reporting systems, billing portals, and even chatbots to help members with common tasks. Platforms such as the ones created by NISC and SEDC offer many of these features.

Self-help solutions can also be used to slowly build and expand customer profiles over time. Customers typically shy away from time-consuming self-audit questionnaires, which are long,

filled with technical language, and more akin to tax preparation. This leads to low usage, completion rates, and customer satisfaction.<sup>32</sup>

But new products are helping to overcome these barriers. A progressive home energy audit is designed to build a customer profile over time, using simple questions and a compelling user interface to keep customers engaged. For example, in 2014, Arizona Public Service launched the online EnergySavvy’s Energy Analyzer to drive engagement and participation in its Home Performance with Energy Star (HPwES) program for residential customers. The Energy Analyzer provides tailored energy savings recommendations from the utility’s energy savings programs after customers respond to questions about home type, size, year built, and types of HVAC system. This self-service engagement solution increased HPwES program participation threefold compared to standard email campaigns and at a relatively low cost, according to Chris Baker, the HPwES Program Manager at APS.

A progressive home energy audit is designed to build a customer profile over time, using simple questions and a compelling user interface to keep customers engaged.



**FIGURE 3.2: Jackson EMC Energy Marketplace**



A good behavioral efficiency solution does more than simply display a member’s energy usage information; it digests that information and provides members with actionable insights on their energy use.

### Energy Feedback and Behavioral Efficiency

Utility customers are increasingly looking for tools to help them understand and manage their energy usage and expenses, and co-ops can deliver on this engagement opportunity through energy feedback and behavioral efficiency approaches. This is currently a large and active space, with offerings from vendors such as EnergySavvy, Tendril, Opower, Bidgely, Powerley, Aclara, C3, Apogee, NISC, and SCDC. Cooperatives can deliver behavioral efficiency programs using a variety of communication channels, including enhanced paper bills, annual home energy reports, web portals, mobile apps, and in-home energy displays.

A good behavioral efficiency solution does more than simply display a member’s energy usage information; it digests that

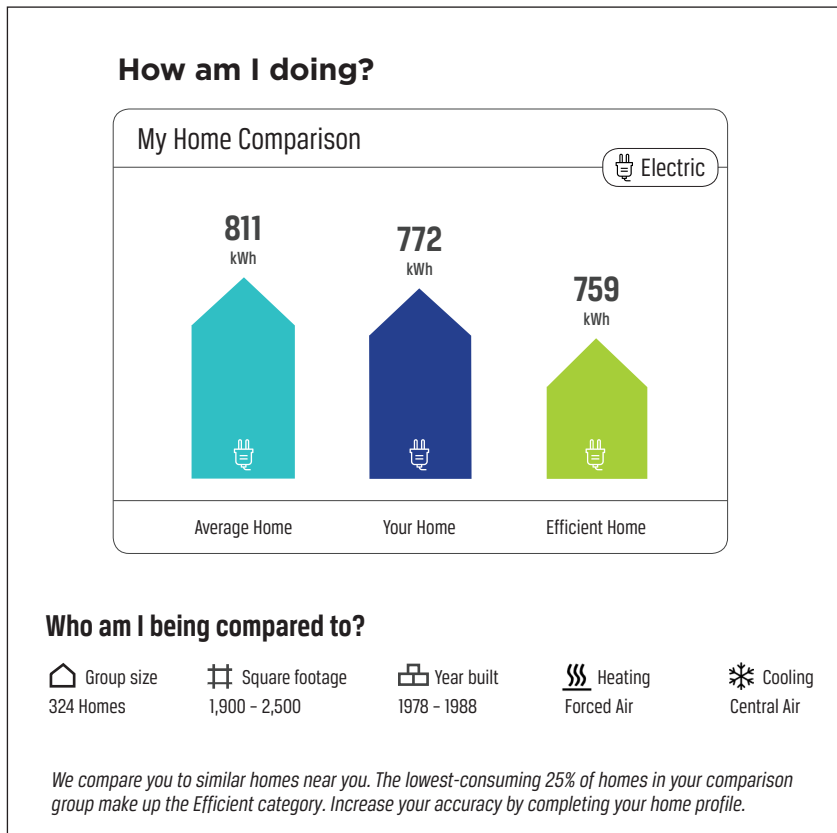
information and provides members with actionable insights on their energy use. Below is a summary of some of the strategies used by leading behavioral solutions to bring meaning to customer usage data.

#### SOCIAL COMPARISONS AND BENCHMARKING

Social comparisons and benchmarking have been a component of enhanced billing and energy reports for years and have proven to be a successful behavioral engagement strategy.<sup>33,34,35</sup> These strategies help members understand their usage compared to homes like theirs (Figure 3.3). The cooperatives and third-party providers interviewed emphasized that computing credible neighbor comparisons can be difficult due to variation in home types and demographics.<sup>36,37</sup> As an alternative, self-comparisons examine how a member’s usage compares to last year or an established goal.

Connexus Energy has met regulatory efficiency targets and improved customer satisfaction using Opower home energy reports. (See [Case Study D, “Home Energy Reports: a Simple Way to Engage Members.”](#))

Utility customers are increasingly looking for tools to help them understand and manage their energy usage and expenses.



**FIGURE 3.3: Example of a Social Comparison Dashboard.**

Source: Tendril

**BILL FORECASTING AND HIGH BILL ALERTS**

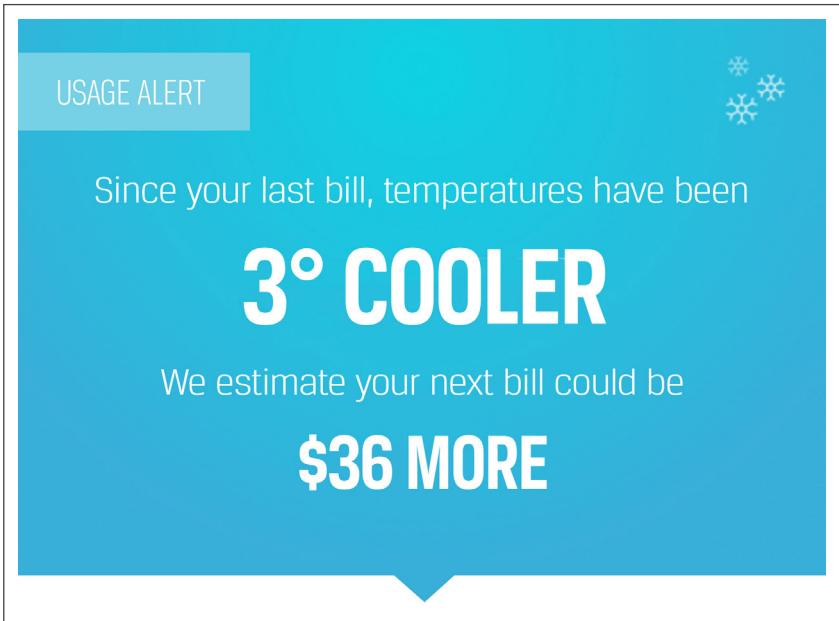
A common pain point for cooperatives and their members is bill shock; high bill complaints drive call center volume at larger utilities. To address this—and help flag high bills before they occur—vendors have developed algorithms to estimate customers’ upcoming bills based on their

current and historical usage patterns and proactively push this information to customers through different channels.<sup>38</sup> One such alert is shown in Figure 3.4.

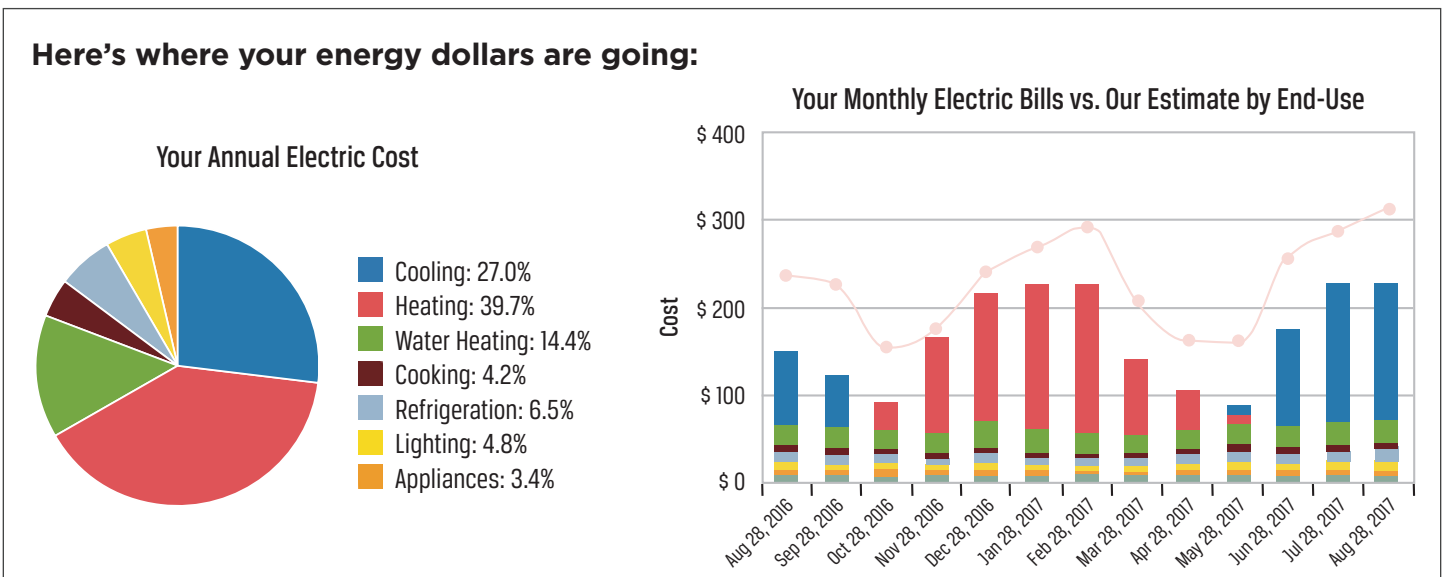
**LOAD DISAGGREGATION**

One question nearly all customer-members want to answer is, “Where is my electricity going and what are the biggest opportunities for me to save?” AMI data alone cannot reveal the answers. Vendors—including Bidgely, Powerley, and Energy-Savvy—now offer load disaggregation or non-intrusive load monitoring (NILM) algorithms that can split AMI usage data by appliance type or categories, without additional in-home devices (see Figure 3.5).

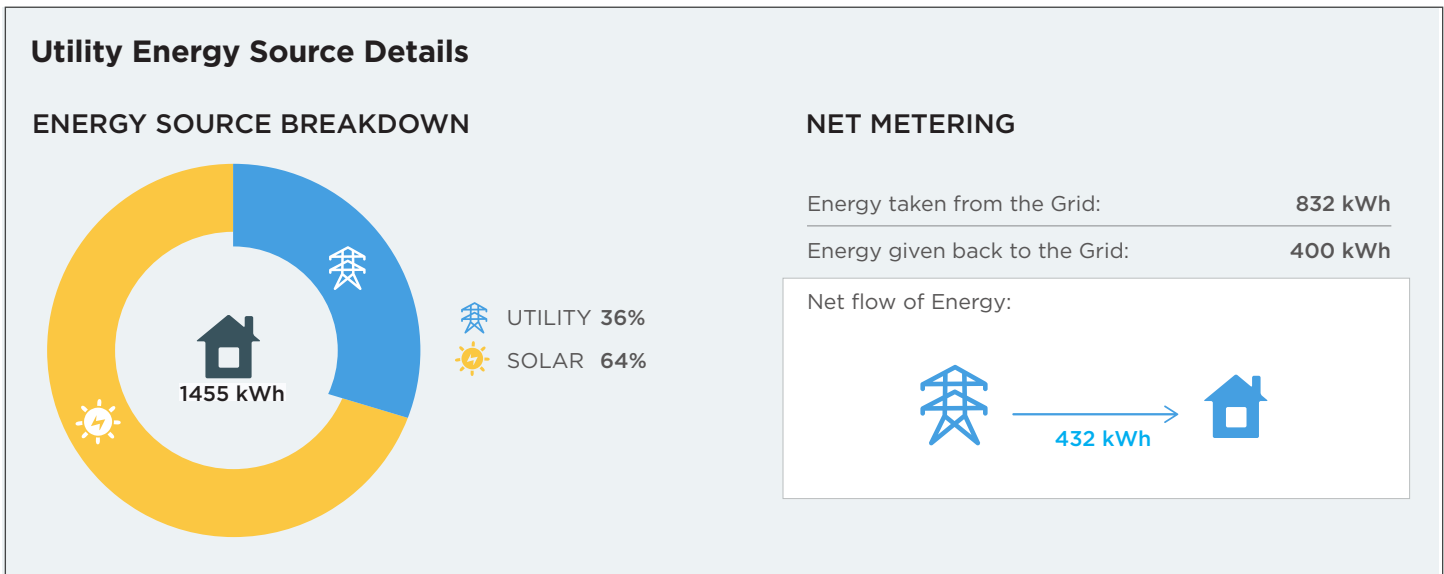
Other vendors offer wireless plugs to control devices, which accurately measure their specific energy consumption. Some solutions additionally claim to virtually meter rooftop solar production without a direct integration with an owner’s PV system (Figure 3.6). According to Nathan Grahl, Principal Data Analyst at Great River Energy, the G&T is now exploring disaggregation services using in-house algorithms as a service for member distribution cooperatives.



**FIGURE 3.4: Personalized Messaging Alerting User of Potentially Higher Heating Use.** Source: Tendril



**FIGURE 3.5: Personalized Energy Report from Union Power Cooperative that Breaks Energy Spending into Several Common Usage Categories<sup>39</sup>**



**FIGURE 3.6: Bidgely Dashboard with Virtual Metering of Household Energy Sources and Net Consumption from Grid**

Gamification adds elements of video gaming — such as scores, competition against peers, badges, and social recognition — to utility programs to spur deeper engagement.

**PERSONALIZED SAVINGS TIPS AND RECOMMENDATIONS**

Successful solutions also provide personalized savings tips to keep customers engaged. According to a 2013 Accenture report, 58% of customers want their utility to provide recommendations on energy-efficient appliances and devices.<sup>40</sup> Personalizing these tips not only ensures that the information is relevant, but also establishes credibility and trust.

**GAMES AND REWARDS**

Gamification adds elements of video gaming — such as scores, competition against peers, badges, and social recognition — to utility programs to spur deeper engagement. Over the past few years, electric cooperatives and utilities have developed scores of games to encourage energy-efficient behavior.<sup>41</sup>

Cooperatives are no stranger to competitions and awards, but technology-driven

gamification is rare. Southern Maryland Electric Cooperative (SMECO) has hosted two energy efficiency competitions, each lasting three months and with the goal of achieving the deepest electricity savings among other households. SMECO used a combination of Facebook and Opower’s Facebook app to drive the competitions and promoted the programs using traditional media as well as email, social media ads, and digital banners.<sup>42</sup>

Like many co-ops, Minnesota Valley Electric Cooperative (MVEC) operates a summertime Beat the Peak program, which has grown steadily since it was introduced in 2013. MVEC has used gamification concepts to drive greater member participation. Annual savings vary year-to-year based on how many voluntary events are called, but the program has resulted in engaged and happy members. (See **Case Study C, “Members Actively Curtailing Usage – Beat the Peak.”**)

Smart devices are beginning to unlock the potential of a fully connected smart grid.

## Device Integration and Home Energy Management

Electric cooperatives and utilities are increasingly investing in smart home solutions — such as smart water heaters, smart thermostats, and other connected devices — as a way to both engage customers and achieve DR or EE. Co-ops may incentivize the purchase of select devices through conventional rebate programs and energy marketplaces. They can also partner with vendors to “harvest” existing smart device users within their service territories and recruit them for programs. Below are some of the ways that cooperatives are employing smart devices.

### SMART DEVICES FOR DEMAND RESPONSE

Smart devices are beginning to unlock the potential of a fully connected smart grid. So far, co-ops and utilities have focused most of their customer smart device efforts on smart thermostats. At North Carolina Electric Member Corporation (NCEMC), a G&T serving North Carolina, many of its member co-ops have deployed ecobee thermostats. Members can buy discounted thermostats from their co-ops in exchange for enrolling in the load management program. Participants are notified two hours before a control event. During the event, the thermostat will adjust its set point (either up or down, depending on the season) to shed load. Members can opt out of the event through their smart phone or directly on the thermostat, and any opt-outs are recorded for the co-op’s information.

Similarly, CoServ Electric has implemented Nest thermostats as part of Nest’s “Rush Hour Rewards” program to help mitigate summertime peaks. (See [Case Study B, “Peak Reduction – Member Engagement Drives Reduced Member Costs.”](#))

### EMBRACING MEMBER CHOICE THROUGH ‘BRING-YOUR-OWN-DEVICE’ PROGRAMS

Co-ops can also leverage the existing base of smart devices that members have purchased through bring-your-own-device (BYOD) programs. For example, CoServ Electric partnered with Nest, which identified 15,000 existing Nest thermostats in CoServ’s service territory.

(Since there are multiple retail electricity providers in this area, not all 15,000 thermostats belonged to CoServ members.) CoServ members in these zip codes were invited to enroll existing or newly purchased Nest thermostats. (See [Case Study B, “Peak Reduction – Member Engagement Drives Reduced Member Costs.”](#))

In addition to the ecobee program discussed at left, NCEMC and its member cooperatives are using BYOD services for both Nest and ecobee thermostats in their DR program. This allows members to participate in a DR program with greater flexibility and choice in their smart device ecosystem.

### BUILDING-GRID INTEGRATION THROUGH SMART DEVICES

Applications such as community storage use smart devices to integrate homes and commercial buildings with the grid by providing load flexibility. Home energy management platforms with smart device integrations — such as Tendril’s Orchestrated Energy platform — can generate unique optimization plans for a home’s HVAC system based on building characteristics, local weather patterns, and customer preferences.

These systems essentially leverage the home as a battery and maximize the storage available under unique conditions. The technology is “set-and-forget” and invisible to the consumer, maintaining comfort preferences while delivering automated savings to both the consumer and the utility.

‘Set-and-forget’ technology is invisible to the consumer, maintaining comfort preferences while delivering automated savings to both the consumer and the utility.



Community storage through water heaters presents another compelling opportunity for co-ops and their members.

Community storage through water heaters presents another compelling opportunity for co-ops and their members. In Minnesota, Great River Energy coordinates nearly a gigawatt-hour of distributed storage in water heaters in the service territories of its 28 distribution cooperatives. Great River Energy integrates this common home appliance with intermittent renewable energy production, funneling excess generation from these sources to water heaters using advanced controlling systems. Participating members are able to save up to \$200 annually.

“When the wind is blowing or the sun is shining, large capacity water heaters can be enabled to make immediate use of that energy to heat water to high temperatures,” explains Gary Connett, director of member services. “The water heaters can be shut down when renewables are scarce and wholesale costs are high.”<sup>43</sup> (See the [Community Storage Initiative website](#) for further details.)

#### DRIVING ENHANCED INSIGHTS THROUGH SMART DEVICE DATA

Once a member owns a smart device and has entered into a smart-device-driven program, the co-op may gain further insights by combining smart device and AMI data streams. For example, Vermont Energy Investment Corporation has developed its STAT analytics software to use AMI and smart thermostat data to

remotely audit homes, identify promising candidates for weatherization upgrades, and conduct independent measurement and verification (M&V) on demand response events.<sup>44</sup>

Detroit-based Powerley provides utilities an all-encompassing smart home solution. Although yet to acquire a co-op customer, Powerley is now available to customers of DTE Energy, AEP Ohio, and BC Hydro, among others. Powerley and BC Hydro, a Canadian utility based in British Columbia, are running a pilot that integrates home energy management within a complete smart home solution to increase energy efficiency and customer engagement. BC Hydro pilot customers receive energy insights and can manage smart home devices through the Hydro-Home app. This is accomplished using the Energy Bridge offering from Powerley, which is connected to the home’s smart meter, giving real-time information on whole-home and disaggregated appliances.

Energy Bridge also acts as a smart home hub, allowing for the control and automation of smart devices. An additional, utility-facing offering, Powerley Portal, allows utilities to analyze behavioral data, execute advanced demand response programs, manage program logistics, and capture energy usage insights.

# 4

## Overcoming Barriers to Customer Engagement Technology

Any programs offered by a vendor, especially those requiring personally identifiable information (PII), should be opt-in.

### Privacy

Privacy is one of the biggest challenges faced by any organization that regularly handles personally identifiable information. Who has access to this information and how will it be used? Although members may trust their co-op with their personal and billing data, they may be leery of an unknown third-party vendor using it, even with the co-op's blessing. When evaluating and selecting customer engagement partners (or any vendor), co-ops have a responsibility to clearly understand all data policies, practices, and legally binding terms related to member data.

#### **The following are some general best-practice guidelines related to member data privacy:**

- Any programs offered by a vendor, especially those requiring personally identifiable information (PII), should be opt-in. Members should never have to involuntarily provide PII to a third party.
- Decide what, if any, PII will leave the co-op. It should be possible to establish a working relationship with a vendor without needing to share any PII from members. If the vendor needs PII, the member should provide it voluntarily as part of the onboarding process.
- It may still be necessary to share personal identification (PID) with third parties, but co-ops should limit these to one or two data points, such as account numbers or meter IDs. Avoid using more interpretable data for PID, such as member addresses.

Co-ops should communicate the vendor's practices to members so they can make informed decisions about opting into new services. Here, past guidance from NRECA regarding the transition to AMI meters is instructive. See NRECA's 2014 report, *Building Consumer Acceptance to Maximize the Value of Grid Modernization*, for further information.

When evaluating and selecting customer engagement partners (or any vendor), co-ops have a responsibility to clearly understand all data policies, practices, and legally binding terms related to member data.

## Security

Related to data privacy, data security and custody are also of concern. How, where, and how long will member data be stored? Is it uploaded through a secure channel? Will all employees of the vendor have access to it or only a select few? What is the vendor's communication policy in the event of a breach? What expectations does the vendor have of the co-op? Does the vendor partner with any additional third parties that will have access to member data?

These and other questions are critical to answer in data-sharing arrangements. Keep in mind that, if data is being *pulled* by a third-party from co-op-owned storage (instead of *pushed* by the co-op to third-party secure storage), access rights need to be extremely narrow to avoid providing access to other co-op data resources.

If your co-op is thinking about engaging with a third-party customer engagement technology vendor, it is a great time to ensure that your organization is following cybersecurity best practices in general. These include establishing a cybersecurity risk mitigation plan and ensuring that the appropriate roles and chain of command exists within the organization for sign-off on data security issues. See NRECA's cybersecurity resources for comprehensive information.<sup>45</sup>

## Perceived Co-op Roles and Risk Tolerance

Every co-op is a unique expression of the community in which it resides, leading to differing perspectives on co-op versus third-party vendor roles. Some cooperatives may shy away from third-party customer engagement solutions because the co-op does not wish to cede any part of its role as "trusted energy advisor" to another organization. Other co-ops may be comfortable with incorporating third-party services behind the scenes,

but want to retain control of all aspects of marketing these new services.

Customer engagement vendors typically work with customers to adapt a project to the needs of the co-op. For example, vendors commonly offer "white label" web and mobile solutions that can be rebranded according to the cooperative's brand guidelines to provide a more seamless experience for members.

Co-ops also have different motivations and appetites for risk when it comes to investing in customer engagement technology. There are tangible risks involved with implementing new technology, especially where staff is already stretched thin. However, there are also risks associated with inaction. As member expectations shift in accordance with mass-market technologies and as third parties—such as solar installers and smart device manufacturers—become prominent in member households, co-ops risk losing recognition as a trusted energy advisor.

## Resource Limitations

Building out a home-grown member engagement technology and analytics solution is, in many cases, out of reach even for larger co-ops due to budgetary and time constraints. As with many positions at electric cooperatives, IT staff wear many hats and are often stretched thin between handling everyday situations and responding to unexpected and urgent issues.

Partnering with third-party vendors, however, still requires both financial and human resources. Naturally, staff time is required to vet and manage vendors, including involvement of program, marketing, and IT personnel. Integration with customer engagement solutions will require involvement from co-op staff with important skillsets, such as database management, and these skills may be in short supply, depending on your organization.

There are risks involved with implementing new technology. However, there are also risks associated with inaction.

Clearly defined and well-vetted projects support staff efficiency and lower overall budgets.

If a co-op wants to work with a third-party, its data service must also agree and be able to support the effort. This could require more coordination from all parties, or delay or cancel a project if all parties aren't on board.

Many vendors offer a range of options, from hands-off, turnkey solutions to arrangements that rely more on co-op staff for development and support. Work with potential vendors to understand the various ways they are able to provide not only the product, but also other services, like marketing and tech support.

Whether they are developed internally or by a third-party, new services require time and money upfront. It is efficient in the long run to undergo a thoughtful decision-making process to define the co-op's business needs for the service, and to ensure the service is also appealing to members.

#### DEFINING PROJECT GOALS

For co-ops that are able to develop data-driven approaches internally, defining project goals may be even more important. This will enable developers to mine and analyze data efficiently.

For example, what is the minimum data interval needed to accomplish the task? Can AMI meters provide all the required data or are other sources needed, like demographic and building stock data? What, if any, information will members need to provide and is what they provide accurate?

Gathering and storing unnecessary data may be burdensome. Changing direction after a project has started, even if it seems like a minor change to some, may require significant effort on the part of the developers. Sometimes changes are necessary, but they should be minimized to the extent possible with careful up-front planning.

Developers should be consulted at every step of the process as key stakeholders since they are likely to understand nuances that others may be unaware of. Clearly defined and well-vetted projects support staff efficiency and lower overall budgets.

## Challenges from the Vendor Perspective

Co-ops are naturally drawn to vendors that have established relationships with other co-ops. This doesn't necessarily mean that vendors without co-op customers can't provide an excellent service, but it does mean that both parties should work to understand each other's requirements up front.

Perhaps most obviously, many co-ops are quite small when compared to investor-owned utilities. Some vendors may view a co-op's entire membership as the size of a typical pilot. Is the vendor willing and able to work at a smaller scale?

It may make sense for a G&T to host the arrangement with the third-party and offer the service to its distribution members. This may reduce overall cost to each co-op. However, the vendor will likely expect all data to be uploaded in the same format using the same channels from all co-ops. If each co-op manages its data differently, it requires more oversight from the vendor and doesn't offer them any economies of scale.

Data storage and sharing policies may also be an issue. Many co-ops use outside MDMS services for storing customer data, billing history, and meter data. If a co-op wants to work with a third-party, its data service must also agree and be able to support the effort. This could require more coordination from all parties, or delay or cancel a project if all parties aren't on board. If this is the case, it's best to have that conversation early on and to determine what, if any, work-arounds are available.

# 5

## Getting Started

*Given the challenges associated with implementing or expanding customer engagement technologies, where should a co-op start the process? The following strategies can help guide the first steps.*

Member preferences, needs, and pain points are key factors that should guide decisions on customer engagement technology.

### Know Your Members

Member preferences, needs, and pain points are key factors that should guide decisions on customer engagement technology. Assuring that the co-op offers programs that members will get involved in is a first step in engagement success.

The range of techniques co-ops use to understand their members may be as simple as surveys, but more advanced processes — such as design thinking — may help co-ops better empathize with members.

### Know Your Co-op's Capabilities

No one solution works for every co-op, so it is important to evaluate your co-op's capabilities and resources to understand its capacity for implementing or expanding customer engagement technology. Important factors to consider include:

- **Scale.** How many members are likely to participate in the program? In general, the more participants, the more cost-effective the program can be.
- **Incentives.** What economic or regulatory incentives does the co-op have? Can the program be designed to leverage these incentives?

- **Goals.** Beyond regulatory or economic incentives, what are the goals of the co-op? How does member engagement help achieve those goals?
- **In-House Skills.** What skills do co-op staff members bring to the program? Do they have the IT and analytics expertise to implement the program, or will additional resources be required?
- **Impacts on Other Entities.** Programs implemented by distribution co-ops may impact their G&T, and vice-versa. Identify any unintended impacts.

### Crawl, Walk, Run

Before adopting a complete customer engagement solution, consider what you can achieve with the data and capabilities you already have. Even simple programs, such as home energy reports, can yield positive results. In fact, both cooperatives and vendors noted that home energy reports are generally more effective and useful to members than web portals.<sup>46,47</sup>

Next, consider goals beyond what you can currently achieve and plan a way to build the capability to get there. Add complexity only when necessary. Pilot and experiment with new programs before rolling out to your full membership, or look to other co-op pilots,



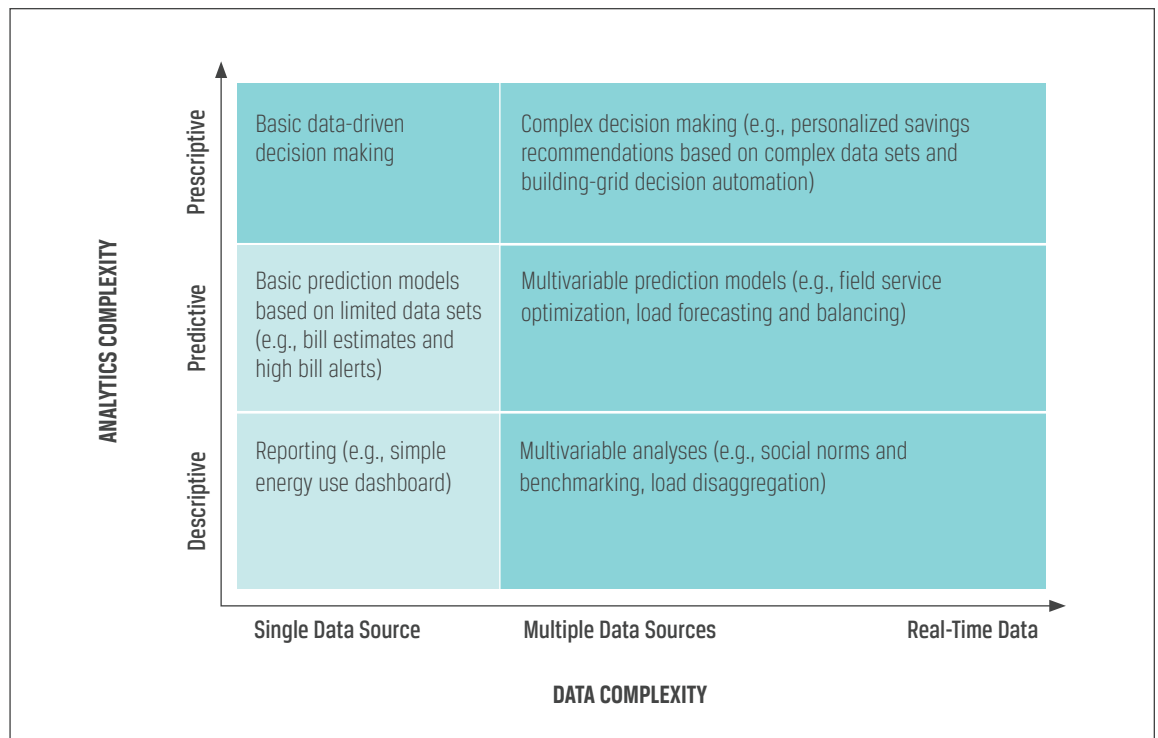
bearing in mind any significant differences between that co-op and yours that could impact results. If considering third-party solutions, understand the degree of customization and co-op staff time required to run the program. A large degree of customization can quickly drive up costs.

Co-ops can begin to chart a course to customer engagement technology advancement by thinking in terms of the complexity of the data (single source, multiple sources, and real-time data) and the analytics capabilities (basic descriptive systems, moderately complex predictive systems, and more advanced prescriptive systems); see Figure 5.1. The light blue areas of the figure represent simple starting points for customer engagement technology where value can be easily mined and experience developed.

Co-ops should only progress to the darker blue areas once they have built experience and demonstrated the value of simpler approaches.

### Get to Scale with Shared Resources

Many distribution co-ops may find that programs are not cost-effective on the scale of one co-op. The program may require more IT staff time than is available, for example. Sharing resources like IT staff with other co-ops can reduce implementation and operating costs, increasing cost-effectiveness. Scaling up efforts to include co-ops within a G&T – or using other co-ops like NRTC (National Rural Telecommunications Council) or NISC – can help reduce overhead and increase cost-effectiveness.



**FIGURE 5.1: Customer Engagement Technologies Can Perform Tasks Ranging from Simple Descriptions to More Complex Capabilities that Predict Outcomes or Help Determine Which Actions to Take<sup>48</sup>**

# 6

## In-Depth Case Studies

### Case Study A DR Program Evaluation and Targeted Marketing

#### BACKGROUND

In 2016, **Great River Energy**, a G&T headquartered in Maple Grove, Minnesota, and member distribution cooperatives — **Minnesota Valley Electric Cooperative** (MVEC) of Jordan, Minnesota, **Lake Region Electric Cooperative** (LREC) of Pelican Rapids, Minnesota, and **Runestone Electric Association** (REA) of Alexandria, Minnesota — started multiple demonstration projects to improve the efficiency of distribution systems and develop new ways to serve members using data.<sup>49</sup>

#### EVALUATING DEMAND RESPONSE (DR) PROGRAM EFFECTIVENESS

Many co-ops offer their members the opportunity to participate in demand response programs. Measuring and validating the effectiveness of DR programs, however, can be difficult and costly. In 2016, Great River Energy partnered with two of its distribution co-ops — MVEC and LREC — to conduct a demonstration project to verify the value of DR programs using AMI and MDMS data. The goal was to evaluate a common assumption made in many cycled air conditioning (AC) demand response programs: that the DR program results in a load reduction of 1 kW per unit during peak.<sup>50</sup>

By comparing AMI hourly load profiles of participating homes and a control group of similar homes that were not participating in the program, the study team found actual load reductions that were significantly lower than the common assumption of 1 kW. Decreases ranged from 0.3 to 0.5 kW per unit, according to Nate Grahl, principal data analyst at Great River Energy, and Amelinda Hendrickx, energy services engineer at LREC. Savings correlated to daily energy usage, indicating that the largest consumers were the largest savers as well. Thus, as noted by Grahl, “To achieve better cycled AC results, our member cooperatives need to be able to break down consumers by usage type to identify who has the greatest potential to reduce loads for cycled AC programs to be more efficient.”

Daily energy usage is just one metric that can help identify the best members for a particular program. Grahl is currently assessing other data sources — such as GIS, census data, disaggregated load information, and end-use surveys — to improve segmentation and better-targeted program marketing.

*Continued*

## Case Study A (Cont.)

### DATA-DRIVEN ENROLLMENT STRATEGY: TARGETED MARKETING

Building on the previous results, LREC conducted a summertime pilot program for residential central AC in 2016 and 2017 to evaluate the impact of targeted marketing on customer load reductions during DR events.

To discover the highest value DR households, LREC identified members with central AC using data from Great River Energy's 2013 member survey. Next, the co-op examined the annual energy use of those members using its AMI data, and identified homes that offered significant DR resource opportunity: in this case, households that used more than 1,000 kWh on average per month in the previous 12 months. These households were specifically targeted for the program through direct mail and phone calls and, for those who responded positively, LREC confirmed good fits by making sure their annual peak usage coincided with the summer peaks. Final screening ensured that the home was not already in a program, had functioning wi-fi to communicate with the smart thermostat, did not have a heat pump AC unit, and was not a seasonal home.

Over the course of two summers, LREC installed smart thermostats in 30 targeted member homes and provided training to those members on proper operation of their new thermostats. LREC used a utility portal to schedule start and end times for DR events. All DR events were voluntary; all participant groups had the option to opt-out of any and all DR events with the knowledge that opting out could result in forfeiting that month's bill credit. Participating members received a bill credit at the end of each month during peak demand season.

LREC deemed the pilot study a success; the co-op leveraged its AMI data to target the right-fit customers. Actual load reductions were around 0.6 kW per unit per event, higher than the 0.3–0.5 kW reductions resulting from conventional programs run by Great River Energy and LREC. The member opt-out rate was less than 1%.

Despite the positive results, preliminary findings available at the time of this writing indicated the cost-effectiveness of the pilot was low because the cost of providing the smart thermostat and using the vendor portal was high compared to the DR benefits achieved. According to Hendrickx, low cost-effectiveness might be explained by the co-op's older demographic. Its members seem to already save where they can, limiting additional savings opportunities. Other cooperatives might achieve higher reductions using similar market targeting techniques. Hendrickx believes conducting a similar demonstration project would be a key first step for other coops to identify best-fit members and understand the achievable demand response benefits.

### LEVERAGING DATA TO IDENTIFY MISSED DR OPPORTUNITIES

Faulty DR equipment leads to reduced DR savings and can incentivize members who are not actually delivering DR results.<sup>51</sup> Runestone Electric Association (REA), of Alexandria, Minnesota, has been blazing its own trail to improve DR programs by identifying missed DR events due to faulty equipment, using a variety of data sources like GIS, MDMS, and CIS.

Ryan Rooney, Energy Services Manager at Runestone Electric Association, outlines the issue. "The co-op sends a DR control

*Continued*



### Case Study A (Cont.)

signal to the DR switches. There is no way to do a home-by-home validation that switches are working and that the co-op is getting the expected savings.” Using AMI interval data, REA identified cases when equipment did not respond to a DR control request.

REA has about 8,000 VHF radio paging switches on residential water heaters, furnaces, and AC units. With hourly AMI data, REA observed a DR switch failure rate of up to 20% during individual load control events in its residential DR programs. The lack of response was due to several different issues, including bypassed DR switches, faulty switches, and VHF

signal issues, said Rooney. To date, the project has successfully increased the demand savings by more than 800 kW for the heating months of October through March, and Rooney expects savings to increase as more nonresponsive DR switches are remedied.

Key to the success of the project was REA’s in-house expertise to lead this type of data-driven project. Privacy and security, as always, were important for REA and its members. To mitigate that risk, REA worked with Star Energy Services — an engineering firm owned by co-ops and partly owned by REA — on technical issues that couldn’t be addressed in-house. ■

### Case Study B

#### Peak Reduction: Member Engagement Drives Reduced Member Costs

For many co-ops, demand charges comprise a significant portion of annual electricity cost. For **CoServ**, a Northern Texas distribution co-op based in Corinth, Texas, more than 40% of power supply costs are demand charges related to summertime cooling load. Although the co-op had a voluntary, member-initiated curtailment “Beat the Peak” program in place, enrollment had been low. To increase DR program participation, CoServ explored a program partnership with Nest.

Initial analysis by Nest indicated that at least 15,000 Nest thermostats were already installed in zip codes located in CoServ service territory. (CoServ is not the only provider in some of these zip codes, so not all of these thermostats belonged to CoServ members.) A small DR pilot program in 2015 indicated promising member interest, so CoServ moved ahead with its Nest thermostat-enabled DR program.

For program enrollment, CoServ reached out to members who already owned a Nest thermostat, as well as members who did not. Nest supported the marketing effort by emailing Nest users and co-branding in retail stores. After signing up for the Rush Hour Rewards program through the Nest portal, members initially received a \$100 bill credit for up to two thermostats, and a \$40 credit for each household for each subsequent year they continue in the program. Terms have since been updated so that members receive a bill credit for each thermostat for subsequent years. CoServ avoids capital investment and avoids any installation or maintenance costs.

The program works by pre-cooling homes before peak times. CoServ uses Nest’s utility portal to set up DR events, and uses both Nest and AMI data to confirm DR event participation. CoServ can initiate

*Continued*

### Case Study B (Cont.)

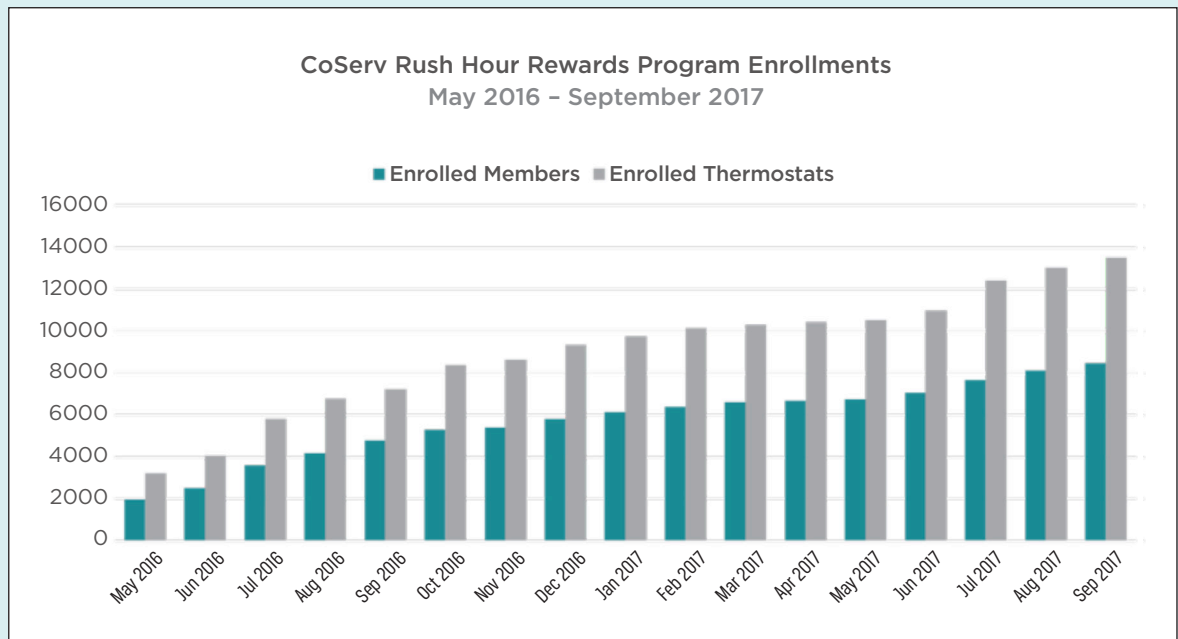
up to 16 events during the summer, with no more than 3 events per week.

Members responded positively to the program; CoServ reached its target of 3,000 enrolled thermostats in the first year in just four weeks. Enrollments have continued to increase steadily, reaching 13,500-plus devices used by more than 8,500 members as of September 2017 (see Figure 6.1).

So far, the program has yielded approximately 1.25 kW saved per thermostat per event, which reduces CoServ’s demand charges and provides a positive return relative to the program

incentives and related costs. Opt-out rates have been less than 5%; CoServ credits this to member satisfaction with the program and the thermostats’ ability to conduct pre-cooling and demand response in a nondisruptive way.

This program presents an interesting solution to privacy and data security concerns. Here, CoServ did not create a new data-sharing relationship; rather, the co-op relied on existing relationships. Members were already sharing their information with Nest, which sends aggregated savings information to CoServ. CoServ, in turn, can verify savings using AMI data. ■



**FIGURE 6.1: CoServ Rush Hour Rewards Program Enrollments.** Source: CoServ

## Case Study C

### Members Actively Curtailing Usage — Beat the Peak

To reduce peak charges, increase member engagement, and give back to the community, **Minnesota Valley Electric Cooperative** (MVEC), based in Jordan, Minn., introduced its Beat the Peak Energy Challenge program in 2013.<sup>52</sup> Members who sign up for this free, voluntary program are notified (by email, text, or a phone call) one day in advance of peak demand days in the summer. Individuals compete for cash prizes and teams compete for donations to their charity of choice.

Members can find information about the program and sign up for it on MVEC's website as either an individual household or as part of a team. When a peak demand day is announced, members take action to curtail their usage, typically from 5 to 9 p.m. AMI data are used to calculate savings for each event. Members who save the most electricity win cash prizes. In 2016, MVEC awarded more than \$25,000.

In the first year of the program, MVEC called 11 events, each lasting 4 to 5 hours and generally between 4:30 and 9:30 p.m. More than 900 members participated, saving 38 MWh and reducing MVEC's power costs by approximately \$51,000. Anecdotal information indicated that participating members were very engaged and expressed confidence and trust in the co-op.<sup>53</sup>

Savings depends on the number of events called and the weather. Cooler summers mean fewer events and lower savings, but the summer of 2013 saw both the maximum number of events and the greatest savings achieved during the program.

Participation, however, has continued to increase; in 2017, more than 2,900 members signed up for the program and saved 19.5 MWh over four events. To date, the Beat the Peak Energy Challenge has saved 134.8 MWh.

Terri Bakken, Vice President of Member Service at MVEC, said this program has been an excellent way for members and the cooperative to save energy and money while helping local charities or organizations within the surrounding communities. "It's easy summer savings for a good cause." ■

*"My kids are so into this they even unplugged my alarm clock. Thanks for doing this. We were talking about this tonight and we think this is a brilliant program. Thanks for being a co-op that cares about all of us!"*

*"It is pretty amazing that this 'contest' has driven so many people to take part—and save lots of energy. Imagine what could happen with a much larger participation rate."*

## Case Study D

### Home Energy Reports: A Simple Way to Engage Members

**Connexus Energy**, headquartered in Ramsey, Minn., is the largest distribution cooperative in Minnesota, serving about 125,000 members. In 2008, Connexus initiated a program partnership with Opower to meet regulatory targets and increase customer satisfaction in its service territory. The program provides residential participants with a home energy report designed to motivate and educate recipients to improve the energy efficiency of their homes.

Control and treatment groups were randomly selected out of a total of 80,000 households. Each group consisted of approximately 40,000 households. Opower began sending home energy reports and developed an efficiency-oriented web portal to the 40,000 treatment households in early 2009.

The home energy reports are designed to motivate households using a comparison of that household to 100 neighbors, provide analysis of usage, and offer household-specific energy-saving tips. Opower also offers a web portal to complement and reinforce the home energy reports. Here, Connexus members can see a more detailed view of their energy usage, compare bills, and get tailored efficiency tips. The web portal encourages action, allowing members to commit to various efficiency improvements, and provides feedback by comparing members' commitments to those of their neighbors.

Opower uses both utility data (meter data and program participation information) and third-party data to provide the member with information on how much electricity they use, plus normative comparisons against neighbors who have similarly

sized homes and use the same heating fuel.<sup>54</sup> Third-party data used includes census and demographic data, plus the Residential Energy Consumption Survey.

From this data, Opower identifies, for a given area, typical heating fuels and appliance information (such as type and energy use) to develop a baseline for normative comparison. This information helps Opower develop customized efficiency tips, such as suggesting replacement of inefficient appliances or equipment.<sup>55</sup>

Power System Engineering, Inc., an independent evaluator, examined savings achieved by the Connexus Opower program over its first 11 months. PSE found that the home energy reports generated 2% in electricity savings, or about 230 kWh per year, for the average household, and met the cooperative's regulatory savings requirements.

Savings have persisted; in the first three years of the program, the average household saved 2.5% of its annual energy use.<sup>56</sup> Moreover, the program has been cost-effective, costing 3.9 cents per kWh saved, comparable to other cost-effective efficiency programs.<sup>57</sup> Members were able to opt-out of the program, but participation averaged 92%.

Customer satisfaction scores suggest that members like the program; Connexus experienced a CSI increase from 85% to 87% from 2009 to 2010.<sup>58</sup> Bruce Saylor, Manager of Regulatory Affairs and Conservation at Connexus, also noted:

*"Our customers have given us great feedback on the Home Energy Reports and it's clear that they're using them to make smarter decisions about their energy consumption."*

*Continued*

## Case Study D (Cont.)

The web portal has been less useful to members, with about 6,700 visits over the years, according to Saylor. Currently, about 24,000 reports are sent out bimonthly.

It is worth noting that Connexus achieved these positive results with monthly meter reads before it had AMI data. Now that Connexus has AMI data, the co-op is examining ways it can leverage that information to improve the program. ■

## Case Study E E-Commerce Platforms: Simplifying the Rebate Process

In August 2017, **Jackson Electric Membership Corporation** (EMC), a distribution cooperative serving 227,000 members in northeast Georgia, launched the Jackson EMC Marketplace, an e-commerce platform powered by Simple Energy. To Jackson EMC, the Marketplace presented an opportunity to increase and measure member engagement.

Although it has many touch points with its members that focus on marketing and communication, Jackson EMC had not previously tracked and measured the reach and success of these strategies in a granular way. Although the co-op considers results from customer satisfaction surveys and industry benchmarks, these indicators generally lag the implementation of customer engagement approaches.

The dynamic Simple Energy platform gives Jackson EMC insight into members' behavior with digital media and allows the co-op to measure its effectiveness. The near-real-time platform provides Jackson EMC with indicators for energy-efficient product sales, installations, future service offerings, and member satisfaction that

more closely match the implementation of an efficiency strategy.

Jackson EMC is serious about being the trusted energy advisor in its service territory and recognizes the trend toward digital communications, information research, and online shopping. The Simple Energy platform contains energy-efficiency strategies similar to those in its new home construction and existing home energy retrofit programs.

Amy Bryan, Director of Residential Marketing, notes that the innovative product lineup is from leading manufacturers and is competitively priced. She sees opportunity in Simple Energy's future product and service plan, which envisions a more complete education, shopping, and installation experience. Simple Energy also holds a solid e-commerce customer satisfaction score.

To implement the platform, Jackson EMC created a cross-departmental team covering marketing, communications, and information technology. Simple Energy has an aggressive implementation and execution strategy, but Jackson EMC found it to

*Continued*

### Case Study E (Cont.)

be well planned out, resulting in successful roll-out. The results provide much value to Jackson EMC and its members.

“The Marketplace provides a platform for us to better engage and serve our members,” according to April Sorrow, Director of Public Relations and Communication at Jackson EMC. “We’ve wanted to provide a thermostat rebate for years, but needed a resource like the Marketplace to make it possible.”

From August to December 2017, the Jackson EMC Marketplace store had more than 40,700 site visits, more than \$193,000 in gross sales, and 883 redeemed thermostat rebates. Many customers (41%) revisited the site after their initial visit. Anecdotal information also indicated that participating members were very engaged, and expressed confidence and trust in Jackson EMC. ■

## 7

## References

## End Notes

1. Orfanodes, L., L. Dethman, and J. Lalos. "Charting the Future: How to Use Customer Engagement Strategies to Ensure Energy Savings and Persistence." *2016 ACEEE Summer Study on Energy Efficiency in Buildings*.
2. Navigant Research. "Web, Call Center, Billing, and Outage Notification Technologies: Global Analysis and Market Forecasts." *Customer Management and Experience Technologies*. 2017.
3. American Customer Satisfaction Index (ACSI). *Benchmarks by Industry*. Accessed November 3, 2017.
4. Touchstone Energy Cooperatives. *National Survey on the Cooperative Difference, 2016–2017 Edition*. Prepared by TSE Services. 2017.
5. Laskey, Alex, and Bruce Sayler. "The Ultimate Challenge: Getting Consumers Engaged in Energy Efficiency." Chapter 23, *Energy Efficiency: Towards the End of Demand Growth*. Pages 591-612. Edited by Fereidoon P. Sioshansi. Academic Press, Oxford. 2013.
6. Ahlen, Jan. "The Consumer Centric-Utility: Empowering Consumers While Managing Risks and Optimizing Assets." *Public Utilities Fortnightly*. July 2016.
7. Ahlen, Jan. "The Role of the Consumer-Centric Utility." NRECA. *51st State Initiative, Phase III*. Smart Electric Power Alliance. September 2017.
8. Curtin, Jim, and Geoff Plese. *Beyond the Hype: What is the Value of Customer Satisfaction to a Regulated Utility?* PricewaterhouseCoopers. April 2015.
9. Touchstone Energy Cooperatives. *Op cit*.
10. Navigant Research. *Op cit*.
11. Accenture. *Actionable Insights for the New Energy Consumer*. 2012. [www.accenture.com](http://www.accenture.com)
12. Accenture. *The New Energy Consumer Handbook*. 2013.
13. Opower. *Utility Engagement Platforms. What are They, and How Do They Work?* 2014.



14. Laskey and Saylor. *Op cit.*
15. St. John, Jeff. **"The 2017 Grid Edge Awards: Projects Defining the Future Integrated, Interactive Electric Grid."** *Greentech Media*. April 7, 2017.
16. Zech, Stephan, and Christophe Guille. Bain Insights. "Utilities and Analytics: How to Find the Value in What's Available Now." *Forbes*. February 28, 2017.
17. Navigant Research. *Op cit.*
18. Accenture. *New Energy Consumer: New Paths to Operating Agility*. 2017.
19. Touchstone Energy Cooperatives. *Op cit.*
20. ACSI. *Op cit.*
21. Touchstone Energy Cooperatives. *Op cit.*
22. Northeast Energy Efficiency Partnerships (NEEP). *Home Energy Management Systems*. 2017.
23. Touchstone Energy Cooperatives. *Op cit.*
24. Smart Energy Consumer Collaborative. **"Smart Grid Customer Engagement Success Stories: City of Fort Collins Utilities Case Study."** 2015.
25. Figure modified from Smart Energy Consumer Collaborative. *Op cit.*
26. Manos, Peter Arvan. **"Great River Energy Demonstrating the Value of Data Analytics: The Cooperatives' and G&T's Perspectives."** *T&D World*. August 24, 2017.
27. *Case Study: "A Glimpse Into the Future"—EnergySavvy's Program Optimization Software Enhances Contractor Management and Inspections*. 2016.
28. Motyka, Marlene. *Expanding the Pie: Opportunities for Utilities to Monetize Customer Engagement*. Deloitte Center for Energy Solutions. 2016.
29. *Case Study: Arizona Public Service Call Center*. EnergySavvy. 2017.
30. St. John, Jeff. **"Can Simple Energy's E-Commerce Portal Help Utilities Sell More Stuff?"** *Greentech Media*. February 24, 2015.
31. Trabish, Herman K. **"Utility Customer Engagement Goes Digital: Utilities Find the Best Engagement Experience Involves Meeting Customers Where They Are—Online and on Mobile Devices."** *Utility Dive*. June 19, 2017.
32. Mazur-Stommen, Susan, and Kate Farley. *ACEEE Field Guide to Utility-Run Behavior Programs*. Report Number B132. Prepared for the American Council for an Energy-Efficient Economy. December 19, 2013.
33. Nolan, Jessica M., P. Wesley Schultz, Robert B. Cialdini, Noah J. Goldstein, and Vladas Griskevicius. **"Normative Social Influence is Underdetected."** *Personality and Social Psychology Bulletin* 34(7): 913-923. July 2008.
34. Schultz, P. Wesley, Jessica M. Nolan, Robert B. Cialdini, Noah J. Goldstein, and Vladas Griskevicius. **"The Constructive, Destructive, and Reconstructive Power of Social Norms."** *Psychological Science* 18(5): 429-434. May 1, 2007.
35. Ehrhardt-Martinez, Karen; Kat A. Donnelly, and John A. "Skip" Laitner. **"Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities."** Report Number E105. American Council for an Energy-Efficient Economy. June 2010.



36. Discussion with Bruce Sayler, Principal, Community and Economic Development, Connexus Energy. September 2017.
37. Discussion with Mark Gately, Data Analytics Manager ,Tendril. September 2017.
38. "Utility Engagement Platforms. What are They, and How Do They Work?" Opower. 2014.
39. Irby, Lauren, and Cindy Smallwood. **"The Evolution of Personalized Videos in the Energy Industry."** NRECA CONNECT Conference, Tampa, May 4, 2017.
40. St. John, Jeff. *Op cit.*
41. Grossberg, Frederick, Mariel Wolfson, Susan Mazur-Stommen, Kate Farley, and Steven Nadel. **"Gamified Energy Efficiency Programs."** Research Report B1501. American Council for an Energy-Efficient Economy. February 11, 2015.
42. *Ibid.*
43. Engerati. **"Electric Water Heaters—A Hidden Battery."** February 17, 2016.
44. Goldman, Ethan, Nick Lange, Jake Jurmain, Greg Fanslow, and Rebecca Foster (Vermont Energy Investment Corporation). **"Are Thermostats the New Energy Audit?"** Association of Energy Services Professionals 24th National Conference and Expo, January 27-30, 2014.
45. **NRECA Cybersecurity Resources.**
46. Discussion with Bruce Sayler. *Op cit.*
47. Discussion with Mark Gately. *Op cit.*
48. Adapted from Zech and Guille. *Op cit.*
49. Manos, Peter Arvan. *Op cit.*
50. *Ibid.*
51. Moorefield, L. and D. Houghton. "Advanced Meter Interval Data: Now You Have It, So What Should You Do With It?" CRN *TechSurveillance*, NRECA. 2013.
52. Hentges, Ryan. **"MVEC's Beat the Peak Energy Challenge."** Presentation at the 26th Annual E Source Forum. September 17-20, 2013.
53. *Ibid.*
54. Ivanov, Chris, and Steve Fenrick. **"Measurement and Verification Report of OPower Energy-Efficiency Pilot Program."** Prepared for Connexus Energy by Power System Engineering. July 28, 2010.
55. Kalin, Ian. **"Who Uses Open Data?"** U.S. Department of Energy. July 15, 2013. Accessed November 2017.
56. Laskey and Sayler. *Op cit.*
57. *Ibid.*
58. Connexus Energy. Home Energy Reporting Program Update. 2010.

## Additional References

- Accenture Energy Consumer Services. *The New Energy Consumer: Architecting for the Future*. 2014.
- Clark, Donnie. "Demand Response Programs." CoServ PowerPoint Presentation. 2017.
- Eldali, Fathalla, Trevor Hardy, Charles Corbin, David Pinney, and Mannan Javid. **"Cost-Benefit Analysis of Demand Response Programs Incorporated in Open Modeling Framework."** 2016 IEEE Power and Energy Society General Meeting, Boston, Mass. July 2016.
- EnergySavvy. **"Case Study: APS Engages the Right Customers at the Right Time with Targeting Software."** 2017.
- Landis+Gyr. **"The New Rules of Customer Engagement."** *FutureReady eZine*. Summer 2016.
- Max, Dana, and Beth Delahaij. **"Customer Behavior and Engagement in a Smart Grid Pilot."** Behavior, Energy, and Climate Change Conference. October 21, 2016.
- Miller, Craig, Paul Carroll, and Abigail Bell. **"Smart Grid Demonstration Project: Final Report."** NRECA-DOE Smart Grid Demonstration Project. March 11, 2015.
- Schellenberg, Josh, and Wendy Brummer. **"Evaluation of PG&E's Two-Year Behavioral Demand Response Study."** 35th Peak Load Management Association Conference, Nashville, Tenn. April 4, 2017.
- Smart Grid Consumer Collaborative. *The Empowered Consumer*. 2016.
- Webster III, Eddie. **"Utility Works to Beat the Peak: Minnesota Valley Electric Cooperative Uses Load-Shifting Strategies to Lower Member Costs."** *T&D World*. September 13, 2017.