

Residential Demand Response

A. Description

The Residential Demand Response product offers residential customers incentives for allowing the Company to directly control operation of their central air conditioners through a direct load control switch or a smart thermostat on days when the system is approaching its peak. This product is generally utilized on hot summer days when Public Service's load is expected to reach near-peak capacity. Since the launch of Saver's Switch in 2000, Public Service has declared an average of seven control days per year. Residential demand response helps reduce the impact of escalating demand and price for peak electricity.

The product consists of two distinct measures, Saver's Switch[®] and Smart Thermostats ("ST measure") that will have individually designed requirements for operation and participation. However, generally all control events normally last for about four hours on a control day and take place in the late afternoon or early evening. With the expanding participant population, Public Service has created sub groups of participants to enable the activation of less than the entire population at a time. This gives the company flexibility to better manage peak demands on the system.

Saver's Switch

When activated, a control signal is sent to interrupt the customer's central air conditioning load during peak periods, typically between the hours of 2:00 p.m. and 7:00 p.m. on weekdays. The product deploys switches with varying load control strategies:

- Switches installed prior to 2004 are cycled 15 minutes out of every 30 minutes (a 50% cycling strategy) during the control period.
- Switches installed after 2004 have utilized an "adaptive algorithm" cycling strategy. This strategy allows the switches to "learn" how a customer's air conditioning is being operated in order to achieve a 50% reduction in load. The newer switches generally provide greater load reduction per unit. Approximately 96% of the approximately 193,000 switches in the field (as of December 31, 2015) use the adaptive algorithm strategy.

Smart Thermostats

The ST measure design is built on several core principles:

- Expand customer choice to include eligible smart thermostats, covering a range of price points and feature sets;
- Offer ~~multiple two~~ enrollment channels:
 - ~~Self-Install – customers choose a new smart thermostat via the Xcel Energy Store ("Storefront") and have it shipped to them so they may install it themselves;~~
 - Direct Install – customers choose a new smart thermostat via the Xcel Energy Store that is provided with installation at no cost to the customer;

- Bring Your Own Thermostat (“BYOT”) – customers that already own an eligible smart thermostat and wish to enroll in the program;
- Customer incentives will vary by channel; and
- An annual DR incentive will be provided for remaining in the program.

This design aligns with best practices identified by other utilities and industry partners by satisfying the following design criteria:

- Keep the offer simple - make the offer to customers simple, straight-forward, and easy to understand. DR is a complex subject and presents a significant barrier for enrollments. Keeping the offer easy to understand helps remove that barrier for customers.
- Compelling marketing – smart thermostats offer customers a variety of value propositions in addition to energy savings in the theme of increased comfort, convenience, and control. Marketing communications must tailor marketing to match the right benefit to the right audience.
- Customers expect fast online experiences – today’s customers expect everything to be seamless, whether it’s an online purchase or enrolling in a utility program. The ST product is offering an entirely digital experience including marketing, instant rebates through the Xcel Energy Store, and a digital DR enrollment experience.
- Customers must understand the program – as previously mentioned, DR is an inherently complicated subject. The ST product will utilize content developed for the Smart Thermostat Pilot to market and educate customers on DR and ensure participants fully understand the program.

The Company will utilize demand response control strategies including, not limited to, temperature offsets and precooling. A temperature offset strategy raises the current temperature set point of a participating thermostat by a fixed amount during a DR event. Precooling refers to the cooling of a home ahead of a DR event so that the home can maintain a more comfortable temperature during the DR event. By increasing participants’ comfort during DR events, they are less likely to opt out of individual events, increasing program effectiveness while minimizing program attrition. Any control strategies deployed will aim to optimize customer satisfaction, event participation and impacts, and cost-effectiveness.

B. Targets, Participants & Budgets

Targets and Participants

Saver’s Switch

The product has been heavily promoted to residential homeowners over the past seven years. As a result, the Company believes that the product penetration rate among eligible Saver’s Switch customers now exceeds 50%. With the high penetration rate, the Company is seeing a challenging recruiting environment with diminishing response rates to promotional activities. In 2017 and 2018, the Saver’s Switch target has been increased to 16,000 new switches per year to reach company commitments for the demand response portfolio. In addition, the Company will replace approximately 4,000 older Saver’s Switches deployed prior to 2005. While increasing

available load relief, due to the technology being newer, these replacements cannot be counted toward the program achievements.

Smart Thermostats

The Company will utilize ~~three~~ two enrollment channels for new participants:

~~Self-Install channel: customers purchase an eligible smart thermostat from the Xcel Energy Store. The thermostat is then shipped to the customer’s home and installed by the customer. Participants in this channel will receive incentives in two steps: one upfront incentive to buy-down the cost of the measure and an installation incentive once customers install their smart thermostat and enroll in the DR program. Self-Install customers will also receive an annual incentive for participating in the program. The Company can more easily expand the product offering to customers through this channel as there are no costs associated with third-party installation or service.~~

Direct Install channel: customers select an eligible smart thermostat and both the thermostat and installation are provided by Xcel Energy at no cost to the customer. Customers selecting this channel will also receive an annual incentive for participating in the program. In order to help mitigate the high acquisition and support costs associated with this channel only a limited number of thermostat choices will be available.

BYOT channel: customers who already own an eligible smart thermostat can enroll to participate in DR events. This channel is an effective enrollment channel because it’s a low-cost, low-entry barrier for customers to sign-up, taking advantage of the existing smart thermostat installed base in Public Service’s service territory. Customers who purchase an eligible smart thermostat from a retailer other than the Xcel Energy Store will be considered BYOT participants.

Budgets

The primary costs in operating the Residential Demand Response product are the cost of switches and thermostats, switch and thermostat installation, rebates for participating customers, and promotional expenses for recruiting participants.

The incremental budget for the addition of smart thermostats will be \$4,523,800, from launch in mid-2017 through the end of 2018.

Program Forecast Summary	2017	2018	Total
Administration & Program Delivery	\$240,263	\$408,788	\$649,050
Advertising, Promotion, and Consumer Ed	\$75,000	\$75,000	\$150,000
Participant Rebates & Incentives	\$1,031,250	\$2,250,000	\$3,281,250
Equipment & Installation	\$93,750	\$187,500	\$281,250
M&V	\$112,250	\$50,000	\$100,000
TOTAL BUDGET	\$1,552,513	\$2,971,288	\$4,523,800

Participant Breakdown	2017	2018	Total
ST Program	7,500	15,000	22,500
Rebate Budget Breakdown			
Upfront Incentives	\$918,750	\$1,837,500	\$2,756,250
Annual Incentives	\$187,500	\$562,500	\$750,000
Energy Savings (Net Gen)			
kW	9,456	18,911	28,367
kWh	57,740	115,480	173,221
Dth	0	0	0

C. Application Process

Customers may sign up Saver’s Switch via a mail-in form, phone, or the Company website.¹ Applications are generally processed and switches installed within six to eight weeks.

Smart Thermostat customers will enroll in the ST measure through the Company’s Xcel Energy Store or online enrollment portals provided by the Company’s vendor partners. ~~Customers choosing the Self Install channel will be verified during the transaction process at the Storefront and approved customers will typically receive their smart thermostat within one to two weeks.~~ Customers choosing the Direct Install channel will receive their thermostat and installation within six to eight weeks. Customers choosing the BYOT channel will receive confirmation within one to two business days, although the Company plans to build the capability to provide confirmation during the online enrollment process.

For any type of direct installation, the installer will make the final onsite determination as to whether the customer qualifies for the product by considering variations such as air conditioner age, code compliance, and where the A/C unit is located (next to the house). The installation for Saver’s Switches normally takes place entirely outside, not requiring customers to be home for the installation. However, access to the home will be a requirement for smart thermostat installations.

D. Marketing Objectives & Strategies

Saver’s Switch

Saver’s Switch is promoted to residential customers using a variety of channels including bill inserts, company newsletters, print and radio advertising, direct mail and telemarketing.

Based on an analysis of customer energy usage during the summer months and market research, Public Service estimates that approximately 325,000-375,000 residential electric customers in Colorado have central air conditioning. Of those, about 193,000 were signed up for the product at the end of 2015. Where possible (i.e. in direct mail and telemarketing), the Company directs its promotional efforts to customers identified as likely to have central air conditioning.

¹ www.xcelenergy.com/saversswitch

In 2017 and 2018, Public Service expects to continue an intense promotional effort with activities including:

- Direct mail, including up-front incentives to new participants
- Outbound telemarketing
- E-mail marketing
- Bill inserts
- Radio advertising
- Print advertising

Smart Thermostats

The Company will develop its own marketing strategies and campaigns to market the ST measure. The majority of marketing tactics developed and executed by the Company will focus on customer segments that do not yet own a smart thermostat. These marketing campaigns will not target current Saver's Switch participants. The Company will also work with smart thermostat manufacturers to identify existing smart thermostat owners and co-market the ST measure to them for the BYOT channel.

The ST measure will promote the product directly to customers primarily using email and other digital channels such as static banner ads and social targeting because these techniques and channels were successful when recruiting participation into the Smart Thermostat Pilot. In addition to digital marketing techniques, the measure will also leverage a web-page for interested customers to explain more about the offering and how customers can participate, in order to support marketing efforts and provide the measure with an online presence.

E. Product-Specific Policies

Saver's Switch has the following additional requirements:

- The product does not offer customers the choice of opting out of individual control days. The one exception is in the case of medical emergencies where customers can be removed from the product on very short notice.
- When a customer moves into a premise with a pre-existing switch, they are automatically enrolled, but notified that they may opt-out.
- Upon request for a Saver's Switch from a customer, a third-party implementer installs the switch. The third-party makes the determination in the field as to whether a switch can be successfully deployed, depending on the age of the A/C unit, electrical code compliance, etc.

Smart Thermostat has the following customer requirements:

- receive residential electric service from Xcel Energy;
- live in a single-family home, defined as a detached single family home, townhome/row house, or duplex;
- have a functioning central air-conditioning (AC) system.

Eligible smart thermostats will also be required to show compatibility with Public Service’s information technology, reporting, and dispatching systems to ensure accurate participation, forecasting, and measurement and verification.

F. Stakeholder Involvement

Saver’s Switch

Public Service recognizes that the HVAC community and homebuilders are in a position to influence customer attitudes towards the product. The HVAC community may also have lingering misconceptions about Saver’s Switch being harmful to customers’ air conditioners. Public Service is planning to increase its efforts to educate the HVAC / builder community about the benefits of Saver’s Switch to customers.

Smart Thermostats

The Company continues to engage with manufacturers that participated in the pilot to expand the types of thermostats offered to customers as well as industry stakeholders that may have experience with other utility offerings or are involved in the sales lifecycle of smart thermostats.

G. Rebates & Incentives

Saver’s Switch

Product participants will receive a \$40 discount on their October energy bills following participation in the preceding summer control season.

Smart Thermostats

The Smart Thermostat product will offer customers upfront incentives to join the program that vary by the enrollment channel used to join the program, and a separate annual incentive each year they participate in the program.

Incentive	Self-Install	Direct Install	BYOT
Upfront – Incentive offered to join the program	\$75 off eligible devices via instant rebate available at the Xcel Energy Store	Free thermostat	\$75
Installation – Incentive paid once thermostat installation is confirmed	\$50	Free installation	n/a
Participation – Annual incentive for participating in control events	\$25	\$25	\$25

~~Should the retail price of an eligible device enrolled via the Self-Install channel drop below \$125, the upfront incentives will not exceed the retail price of the device.~~

H. Evaluation, Measurement, & Verification

Public Service's load research organization leads an annual research project to evaluate the load relief achieved from installed Saver's Switch and Smart Thermostat units. The team hires a consultant—that specializes in load research—to conduct the data gathering and most of the analysis. A sample of participants is included in the research, undertaken annually. This is done with data loggers deployed onsite to monitor A/C run time and measure operations during the cooling season. The results are used to document the extent of load relief achieved during a control day.