Notification Date: August 1, 2014

➢ Summary of 60-Day Notice: Smart Thermostat Pilot

Public Service Company of Colorado (PSCo) is providing a 60-Day Notice to add a Smart Thermostat Pilot to the 2014 DSM Plan, as agreed upon within the Settlement Agreement (Proceeding No. 13A-0773EG). The pilot will provide customers with rebates to purchase and install qualifying Wi-Fi connected thermostats to study the energy efficiency benefits, as well as test demand response benefits associated with those devices.

PSCo anticipates the pilot will result in 1.07 GWh of electric savings and 8,558 Dth of natural gas savings by 2016 under a total pilot budget of $963,769 for electric and $194,731 for natural gas, resulting in an anticipated electric MTRC of 0.84 and gas MTRC of 0.97 over the life of the pilot.

Included with this Notice, are the following documents:

- Product Write-Up;
- Deemed Savings Sheets;
- Electric Forecast Summary; and
- Gas Forecast Summary.

➢ Smart Thermostat Pilot

A. Description

The Smart Thermostat Pilot is designed to evaluate if Wi-Fi connected communicating, "smart" thermostats (see Section E for qualifying device criteria) can save residential customers energy by installing a smart thermostat device and connecting it to the manufacturer's cloud service. In addition to efficiency benefits, Public Service also plans to evaluate smart thermostats' capabilities for delivering demand response capacity in the residential market.

Smart thermostats have garnered a great deal of media attention recently. While smart thermostats provide tangible convenience and comfort benefits to customers, the energy efficiency and potential demand response benefits have not been consistently quantified or measured by independent third-parties for utility programs operating in climates similar to Public Service's Colorado service territory.

In order to test the capabilities, adoption rates, and energy savings associated with these devices, the Company plans to offer a rebate to customers for the purchase and installation of qualifying devices. A condition of receiving the rebate and participating in the pilot will be the release of customers' data for the purpose of studying whether or not a smart thermostat leads to energy savings (through participant use of automated temperature setback programs and choosing temperature setpoints that provide energy savings during setback periods, or via enabling "smart" capabilities beyond selected thermostat setbacks). The energy savings will be calculated through an evaluation, measurement and verification (EM&V) process by a third-party evaluator.

The pilot hopes to address the following questions:

Energy Efficiency:

- What level of energy savings are attributed to the installation and use of smart thermostats? Can a deemed savings value be determined?
- Is a $50 rebate sufficient to encourage customers to purchase and install a smart thermostat?
- Is it possible to create a cost-effective DSM product using resulting deemed energy-savings values?

Demand Response:

- Will a pay-for-performance compensation structure encourage consistent participation in demand response events?
- What incentive levels are needed to optimize participation and demand savings during control events?
- To what degree are customers interested in a "bring your own device" type of demand response program model?

Energy Efficiency

The concept of realizing energy savings by programming a thermostat is straight-forward: scheduling temperature setbacks during times when home occupants are away or asleep ensures no energy is wasted keeping a home unnecessarily comfortable when no one is home and/or awake. However, the execution of this strategy has proven more difficult, so much so that the U.S. Environmental Protection Agency's ENERGY STAR® program stopped labeling programmable thermostats in 2009 and many utilities stopped providing rebates for these devices, due to the well-documented difficulties customers had programming their thermostats. In fact, much research found that programmable thermostats were utilized like their manual predecessors and thus the programmable capability was never employed.

The purpose of a smart thermostat is to address this scheduling issue while improving upon the overall user experience. First, the device is easier to program and makes deploying efficient setback schedules simple. Second, customers can easily make temporary or daily changes to setback schedules without having to reprogram the device. The combination of these features has led smart thermostat manufacturers to report that 80-90% of customers are running a setback program at any given time, and that figure remains fairly constant as vendors sign up new customers (as compared to less than 50% of programmable thermostat users running a setback program).

In addition to helping customers program their thermostat, smart thermostats provide several other features that claim to increase energy efficiency. By using data analytics in the cloud, these devices can automatically optimize individual HVAC system performance and learn when to raise and lower temperatures to recover from setback periods without wasting additional energy. Some devices use motion sensors or smart phone geofencing capabilities to monitor whether users are home and adjust temperatures accordingly. These devices can also provide data sets and operating run times to interested customers to study system performance.

Demand Response

The Company also plans to test the demand response capabilities of smart thermostats. A smaller subset of participants will be recruited to participate in demand response events executed via their smart thermostat through a utility-controlled demand response portal provided by a participating thermostat manufacturer. The pilot will recruit smart thermostat owners that received the energy efficiency rebate for purchase and installation via this pilot, as well as existing smart thermostat owners that purchased a device prior to the pilot launch. The Company will study how event participation is influenced by providing financial compensation for participation, and measure the load reduction provided by cycling participants' air conditioning.

Through the In-Home Smart Device Pilot,[1] the Company was able to learn about voluntary participation in demand response events. The pilot saw event participation rates of 49% in 2012, and 42% in 2013, where customers could opt-out of events at any time, and received no incentive for participation or penalty for non-participation. This pilot looks to research how a pay-for-performance model could influence higher participation levels for demand response events. Customers will be given event notification at least four hours in advance. Participants will have the choice to participate in events or to opt-out. For those that do participate, they will receive financial compensation for participating. For those that opt-out, they will receive no compensation for the events they opt-out of.

B. Targets, Participants & Budgets

Targets and Participants

Based on experience with previous pilots, and other additional research conducted by Xcel Energy, coupled with information from pilot projects currently being conducted by other utilities in the U.S., Public Service expects the Smart Thermostat Pilot to produce annual reductions in electricity and natural gas use in the range of two to five percent for every participating home. Therefore, Public Service estimates pilot energy savings of the following magnitude over the duration of the pilot (2014-2016):

- 1.07 Net Gen GWh
- 620 Net Gen kW (peak-load reduction from energy efficiency)
- 630 Net Gen kW (demand response event reduction)
- 8,558 Net Dth

The Company is targeting up to 5,000 participants for the energy efficiency portion of the pilot by 2016. It is anticipated that the majority of participants will join in early 2015 due to the launch of the pilot in late 2014. It is also important to note that reaching the maximum level of 5,000 participants is not believed to be the sole determinant for deeming the pilot a success. To perform a statistically significant evaluation of energy savings in the 2-5% range, the evaluation must include a minimum of approximately 1,500 participants.

Energy Efficiency: The pilot will target Xcel Energy combination electric and natural gas customers with central air conditioning systems for the energy efficiency portion of the evaluation.

Demand Response: The pilot will recruit from two customer groups for demand response: 1) customers participating in the energy efficiency portion of this pilot, and 2) customers with an existing smart thermostat that was purchased and installed outside of the pilot.

[1] The In-Home Smart Device Pilot was included as part of the Company's DSM Indirect Program from 2011 through early 2014. The final pilot evaluation can be found on the Company's website, here: http://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/CO-DSM/CO-2014-IHSD-Pilot-Evaluation.pdf.

The pilot will allow electric-only customers with central air conditioning to participate in the demand response portion of the pilot.

Budgets

The total budget for the pilot will be $1,158,500, from launch in late 2014 through 2016. The budget for 2014 is $40,750, for RFP and selection of a third-party evaluator, development of partnership agreements with participating thermostat manufacturers, rebates, and some early promotional and marketing efforts (2014 expenditures will be accommodated through budget flexibility; 2015 expenditures will be initiated January 1, 2015; and 2015 and 2016 budgets will be included in the upcoming 2015/2016 DSM Plan filing which will direct all pilot spending following Plan approval).

Pilot Forecast Summary	**2014**	**2015**	**2016**	**Total Pilot**
Electric Budget				
Program Planning & Design	$7,125	$16,150	$16,150	$39,425
Administration & Program Delivery	$10,688	$147,250	$112,031	$269,969
Advertising, Promotion, and Consumer Ed	$5,250	$14,750	$0	$20,000
Participant Rebates & Incentives	$7,500	$193,750	$48,750	$250,000
M&V	$0	$346,875	$37,500	$384,375
Natural Gas Budget				
Program Planning & Design	$2,375	$2,850	$2,850	$8,075
Administration & Program Delivery	$3,562	$23,250	$26,719	$53,531
Advertising, Promotion, and Consumer Ed	$1,750	$3,250	$0	$5,000
Participant Rebates & Incentives	$2,500	$43,750	$16,250	$62,500
M&V	$0	$53,125	$12,500	$65,625
TOTAL BUDGET	**$40,750**	**$845,000**	**$272,750**	**$1,158,500**
Participant Breakdown	**2014**	**2015**	**2016**	**Total**
Energy Efficiency	200	3,500	1,300	5,000
Demand Response	0	1,000	0	1,000
Rebate Budget Breakdown				
Smart Thermostat Purchase Rebate	$10,000	$175,000	$65,000	$250,000
Demand Response Opt-In	$0	$62,500	$0	$62,500
Energy Savings* (Net Gen)				
kWh	0	0	1,074,197	1,074,197
kW	0	0	620	620
Dth	0	0	8,558	8,558
Demand Response				
kW	0	630	0	630

**Energy savings are estimated for forecasting purposes. The measured results of the pilot will be used to claim actual savings associated with pilot activities. Because measured data from the pilot will determine reasonable annual savings, savings will occur starting with customer participation but will not be claimed until the pilot's conclusion.*

EM&V is the primary cost-driver for this pilot, but is necessary to identify the anticipated energy efficiency savings in a statistically significant manner. The proposed plan is to use a matched control group methodology, which will compare usage of customers with smart thermostats to similar homes based on consumption data, geographic location, and customer segmentation information. Once completed, the Company expects that if a full-scale program were deployed, evaluation costs would be significantly less than for the pilot due to the expected one-time nature of monitoring the kW savings through use of a physical on-site device in order to deem a peak-load kW savings value.

The administration and management of a pilot of this scale with multiple manufacturers requires significant labor time, impacting overall pilot cost. Additionally, vendor charges for access to data, online portal, and mobile app development and support, and demand response portal are a significant cost-driver for the pilot budget.

C. Application Process

To participate in the energy efficiency portion of the Smart Thermostat Pilot, customers must complete a rebate application and proof of purchase and installation form, for a qualifying device. Additionally, the device manufacturers must provide verification to Public Service that the device has been installed and connected to their respective cloud service.

Similarly, customers wishing to participate in the demand response portion of the pilot must complete a demand response pilot application agreement, and for customers wishing to participate with a qualifying device purchased and installed outside of the pilot, they must provide proof of installation of a qualified device.

D. Marketing Objectives & Strategies

The Company plans to work with device manufacturers to co-market qualifying products and the pilot program. This includes manufacturers providing online promotion of the pilot program, marketing materials to existing smart thermostat owners to participate in the demand response portion of the pilot, and in-store materials at retail locations. However, the Company also plans to directly promote the pilot using a variety of marketing strategies to solicit customers that could include but are not limited to:

- Direct mail and e-mail
- A web-page for interested customers to explain how to apply and the benefits of participating
- In-store materials at participating retail stores
- Engaging contractors who install smart thermostats

E. Product-Specific Policies

Customers interested in participation will be required to agree to and sign a participation agreement as part of the rebate form. By participating, customers agree to share their thermostat usage data with Xcel Energy (in accordance with Colorado state data privacy rules[2] and Xcel Energy's Privacy Policy). Demand response participants will also agree to the terms of the pay-for-performance model, which states that they will receive no compensation for any event they opt-out of.

To be eligible for the Smart Thermostat Pilot, participants must be Xcel Energy electric and natural gas customers with a central air-conditioning system. Xcel Energy electric-only customers with a central air-conditioning system will be allowed to participate in the Demand Response portion of the pilot.

Rebates will be offered to customers who purchase and install qualifying products, as determined by Xcel Energy. Energy Efficiency rebates will be paid to customers by Xcel Energy once an application form has been completed and submitted, and verification of installation has been received from the device manufacturer. Customers can receive a rebate regardless of whether they participate in the demand response portion of the pilot. Demand response pilot participants will consist of rebate customers who also opt-in to the demand response pilot, as well as customers who do not receive an energy efficiency purchase rebate but meet demand response participation qualification criteria.

For the energy efficiency rebate, the Company has set qualifying criteria for eligible devices, which must offer:

- Wi-Fi connectivity for customers;
- a mobile app and online portal, and;
- on-board or cloud-based optimization of the HVAC system.

Participating thermostat manufacturers must also sign an agreement with the Company to provide usage data for rebated devices. This will include, but is not limited to, a historical record of temperature setback schedules and selected temperature setpoints.

Additionally, the Company will restrict qualifying devices for this pilot to those with utility deployment experience, and well-established market share and awareness, as a method for managing pilot costs which could escalate under unlimited numbers of device models and manufacturers. (If, in the future, this pilot delivers results that would justify transition to a full-scale DSM product, based on energy efficiency savings alone, the Company envisions developing a process to allow more thermostat manufacturers to apply for a "qualifying product status.")

Additionally, for the demand response portion of the pilot, the Company will provide an RFP to thermostat manufacturers, which will be used to select a manufacturer to provide the Company with a demand response portal used to call events. The Company is

[2] CCR 723-3-3026 et seq., available: http://www.dora.state.co.us/puc./rules/723-3.pdf.

restricting demand response to one or two manufacturers' devices because the targeted participant group is smaller, as well as to manage overall pilot costs. Similar to qualifying devices, the Company envisions developing a solution that would allow more thermostat manufacturers' devices to participate in demand response in the future, should the pilot transition to a full-scale DSM product.

To ensure accurate savings calculations and avoid the risk of double-counting energy savings or creating artificially high compensation by "doubling up" on participation in the Company's existing DSM products, the demand response portion of this pilot will be mutually exclusive to Saver's Switch participation. Current Saver's Switch customers who opt-in to the pilot will not be included in the Saver's Switch program for the duration of the pilot. Customers participating only in the energy-efficiency portion of the pilot will be able to maintain their Saver's Switch participation.

F. Stakeholder Involvement

The Company has worked closely with a number of external stakeholders throughout the pilot design process to inform the final design and implementation of the pilot via a Smart Thermostat Study Group, which included representatives from the following organizations:

- Energy Efficiency Business Coalition (EEBC)
- Southwest Energy Efficiency Project (SWEEP)
- Western Cooling Efficiency Center (WCEC)
- Lawrence Berkeley National Laboratory (LBNL)
- Wisconsin Energy Conservation Corporation (WECC)
- Nest Labs
- Honeywell
- EnergyHub
- ecobee
- Schneider Electric
- Landis+Gyr
- Tendril
- E Source
- Colorado Public Utilities Commission Staff

The pilot was initiated to comply with the 2014 DSM Plan (Docket No. 13A-0773EG) Settlement Agreement.

G. Rebates & Incentives

For the efficiency evaluation portion of the Smart Thermostat Pilot, eligible participants will receive a rebate upon purchase and installation of qualifying products. Public Service will test a $50 per unit rebate as the pilot starting point to gauge participation levels at a

rebate of approximately 25% of unit cost. Should the Company see slow participation uptake that limits our ability to adequately calculate energy savings, Public Service may consider raising the rebate level to $100 per unit to encourage increased participation.

For demand response, participants will receive a rebate based on the number of events in which they participated. The Company will test two difference event compensation levels—$5.00 per event and $2.50 per event—to determine the optimal approach to cost-effective savings and participation in events.

H. Evaluation, Measurement, & Verification

Public Service will contract with a third-party evaluator to collaboratively measure impacts. This third-party will be responsible for the analysis, impact estimation, and project management and reporting. Specifically, the third-party will measure and verify 1) the annual kWh and Dth reductions for all energy-efficiency participants, 2) the peak load kW reduction for all energy-efficiency participants and 3) the kW load reductions during events for a sample of the demand response participants. The following specifies in more detail the approach and tasks that will be performed as part of the impact estimation for the Smart Thermostat pilot:

Preliminary Evaluation
To determine the overall impact on consumption, a matched control group will be used. Once all pilot participants have been determined, a control group will be selected based on consumption data, geographic location and customer segmentation information so that each member of the control group is "matched" to a participant. Electric (kWh) and natural gas (Dth) usage data will be collected for each participant and control group member from billing data. This will be used to determine overall energy savings (kWh and Dth).

For analyzing peak load reductions (kW), data loggers will be deployed to a sample of both participant and control group participants. The difference of differences approach will be used again, this time measuring the difference of average peak loads between participants and the control group.

The preliminary evaluation will provide initial estimates for the impact of the Smart Thermostat Pilot based on the first year of the Pilot, to the extent possible based on the number of installed devices, using a difference of differences approach. This task consists of the following subtasks:

- The third-party evaluator will collect load data from the data loggers. Public Service will securely transfer survey data to the third-party evaluator, which will include any available survey or demographic information, the date that participants installed their device, billing data for all participants and control group members. The third-party evaluator will then verify that data are available for all customers in the pilot (both control group and participants), and that the

data are present for all hours and are internally consistent. As part of this subtask, the evaluator will also tie the data from different sources together to ensure consistency and enable the analysis for the remainder of the project.

- The third-party evaluator will estimate impacts using a difference of differences approach. This approach estimates the impact of the Pilot as the difference between the average load shape of the participant group and the control group, corrected for any pre-pilot differences between the two groups.

For analyzing event day demand reduction, data loggers will be deployed to a sample of demand response participants. To analyze event day participation, the thermostat manufacturer(s) will provide data to Public Service showing which customers opted-out of events and which customers chose to participate.

Final Evaluation

Using data from both 2015 and 2016, the evaluator will refine the estimates for summer 2015 from the preliminary evaluation, and will estimate the impacts for fall/winter 2015 and summer 2016. This task consists of the following subtasks:

- Estimate impacts using a difference of differences approach for the entire time period. The evaluator will calculate impacts for winter 2015/2016 and the summers of 2015 and 2016 to check consistency between the summers. The evaluator will calculate both the impacts and the related confidence intervals.
- Estimate impacts using a regression approach for the entire time period. A regression approach accounts for the specific characteristics and appliances of each customer, includes the information about the specific weather on each day, and quantifies how these factors interact to influence the load impact of the pilot. Using a regression model to estimate the impacts will allow Public Service to define the range of impacts that they will see across different customer types and different weather.

The third-party evaluator will prepare a final report with comprehensive results for fall/winter 2015/2016, and the summers of 2015 and 2016. The evaluator will provide the final results and descriptions of the methods used for inclusion in the preliminary evaluation report that they will deliver to Public Service.

Xcel Energy will report on pilot findings and claim pilot savings in the 2016 status report—if the pilot is cost-effective. The Company does not anticipate having statistically significant participation levels by early 2015 to be able to measure full-year savings in time to claim savings in the 2015 status report, and will likely claim savings for all pilot results as part of the 2016 status report.