August 18, 2016

CA Public Utilities Commission
Energy Division
Attention: Energy Efficiency Branch
505 Van Ness Avenue, 4th Floor
San Francisco, CA 94102-3298

Advice Letter 17-E

Re: Request for Approval of MCE Seasonal Savings Pilot Program

Consistent with California Public Utilities Commission's ("Commission") Decision ("D.") 09-09-047, filed September 24, 2009[1] and the Energy Efficiency Policy Manual,[2] Marin Clean Energy ("MCE") requests approval of the MCE Seasonal Savings Pilot Program.

Effective Date: September 18, 2016

Tier Designation: Tier 2

Pursuant to General Order 96-B, Energy Industry Rule 5.2 this advice letter is submitted with a Tier 2 designation.

Purpose

The purpose of this advice filing is to seek approval of the MCE Seasonal Savings Pilot Program and utilize budget from suspended activities in MCE's single family program to fund the proposed pilot.

Background

The purpose of a pilot project is to test a new and innovative concept, partnership, or program design that is intended to address a specific area of concern or gap in existing programs.[3] The Commission articulated ten criteria for proposed pilots in D.09-09-047.[4] The Energy Efficiency Policy Manual restates those criteria.[5] MCE plans to launch the Seasonal Savings Pilot Program, an innovative program designed to investigate the potential cost-effective savings in utilizing smart thermostat technology to remotely modify set points on Heating, Ventilation, and Air

---

[1] D.09-09-047 at p. 48-49.
[2] Energy Efficiency Policy Manual, Version 5, July 2013, Section XII.12 at p. 8-9, available at http://www.cpuc.ca.gov/NR/rdonlyres/7E3A4773-6D35-4D21-A7A2-9895C1E04A01/0/EEPolicyManualV5forPDF.pdf.
[3] D.09-09-047 at p. 48.
[4] D.09-09-047 at p. 48-49.
[5] Energy Efficiency Policy Manual, Section XII.12 at p. 8-9.

Conditioning ("HVAC") equipment. MCE engaged with Energy Division through the ideation process to address each of the criteria in MCE's pilot program design. The results of that process with some additional implementation details of the MCE Seasonal Savings Pilot Program are provided in this advice letter as Attachment A: MCE Seasonal Savings Pilot Plan.

MCE Seasonal Savings Pilot Program

The MCE Seasonal Savings Pilot Program will test an innovative approach to achieving energy savings with energy management technology. This pilot is different from the energy efficiency studies intended to produce a work paper based on energy savings from smart thermostats themselves (*i.e.* "out-of-the-box" efficiency, where customers begin to save energy as soon as they install and begin to use the device).

The Nest Learning Thermostat has already been proven to save energy out-of-the-box. There are a large number of third party measurement and verification ("M&V") studies that have been conducted on the Nest Learning Thermostat and other smart thermostats, including studies underway in partnership with the California investor-owned utilities ("IOUs").[6] The results of these studies indicate that Nest Learning Thermostats can drive savings equal to approximately:

- 10%-12% of heating usage, and
- 15% of electrical cooling usage in homes with central air conditioning.

The Seasonal Savings pilot program takes the Nest Learning Thermostat energy savings one step further by providing customers with incremental energy savings throughout a particular heating or cooling season. The thermostat does this by making micro set point adjustments to the thermostat's schedule for those customers who have opted in to the program over a three week period. The result is cost-effective, incremental energy savings and customer engagement. Nest has run this program elsewhere in the United States but not yet in Northern California's unique climate zones. The attached white paper (Attachment B) summarizes the results of Nest's recent Seasonal Savings deployment in Massachusetts. Of note:

- Participants' set points declined by an average of 1.3°F over the course of the three week algorithm.
- The Program reduced heating usage by an average of 3.5% over the course of the winter, based on a weather-adjusted analysis of run times that included a control group from neighboring states. These savings include the effect of the impact reductions over time.

This program will help to bolster the California-specific energy savings data available to the broader energy program stakeholder group currently studying energy savings. These are driven by smart thermostats like the Nest Learning Thermostats. The current efforts include studies by California's IOUs focused on out-of-the-box efficiency and demand response. While the pilot is proposed specifically in conjunction with Nest, the lessons learned from this pilot will be

[6] https://nest.com/downloads/press/documents/energy-savings-white-paper.pdf.

relevant to any energy management technology that is equipped with controls that allow access to customer thermostat settings.

The details on the pilot design are provided in the MCE Seasonal Savings Pilot Plan, included as Attachment A to this advice letter. This plan includes the results of the ideation process completed by MCE and Energy Division staff prior to submission of this advice letter. The plan includes elements such as the experimental design; the pilot metrics; and an Evaluation, Measurement, and Verification ("EM&V") plan.

Funding for the Pilot

MCE intends to fund the MCE Seasonal Savings Pilot Program out of MCE's existing single family program budget. MCE has recently suspended activities in its Single Family program, creating an opportunity to support an innovative new pilot concept.

Suspension of My Energy Tool

MCE's My Energy Tool is an online engagement tool that helps customers understand their energy usage and receive information about low and no-cost options to save energy. At the time MCE developed the tool, it was an innovative offering that did not exist among the Program Administrators ("PAs"). Since then, a common vendor was retained under contract to the statewide Marketing, Education, and Outreach consultant to develop a similar tool available to all ratepayers in California at no additional cost to MCE. This tool rendered MCE's program duplicative. A recent evaluation report found that MCE's Home Utility Reports ("HURs") program, the core resource activity in MCE's single family program, was not achieving statistically significant savings.[7] In response to the evaluation, MCE suspended the HURs program.[8] In recognition of the newly available statewide tool and to ensure effective use of ratepayer funds, MCE concluded the vendor agreement that covered both the MCE Single Family Home Utility Reports ("HURs") program and MCE's My Energy Tool. The remaining budget from MCE's MyEnergyTool for 2016-2017 is sufficient to fund the MCE Seasonal Savings Pilot Program as shown in Table 1 below. The Seasonal Savings Pilot expenses will be divided equally between Winter 2016 and Summer 2017.

---

[7] Impact Evaluation of 2014 Marin Clean Energy Home Utility Report Program (Final Draft), DNVGL (March 1, 2016) available at http://www.energydataweb.com/cpucFiles/pdaDocs/1445/Res3_4_MCE_HURS2014_FINALdraft_forPublicComments.pdf.

[8] MCE Advice Letter 15-E, filed March 17, 2016 available at https://www.mcecleanenergy.org/wp-content/uploads/2015/11/17_MCE-_Advice_Letter_15-E.pdf.

Table 1: MyEnergyTool Budget Available to Fund Seasonal Savings Pilot

Single Family Program	2016 Budget	2017 Budget	Total
Seasonal Savings Pilot	$30,000	$30,000	**$60,000**
Available MyEnergyTool Budget*	$63,000	$126,000	**$189,000**

*The Available MyEnergyTool Budget includes six months of the 2016 budget and the full 2017 budget for MCE's MyEnergyTool.

Notice

Anyone wishing to protest this advice filing may do so by letter via U.S. Mail, facsimile, or electronically, any of which must be received no later than 20 days after the date of this advice filing. Protests should be mailed to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Avenue
San Francisco, California 94102
E-mail: EDTariffUnit@cpuc.ca.gov

Copies should also be mailed to the attention of the Director, Energy Division, Room 4004 (same address above).

In addition, protests and all other correspondence regarding this advice letter should also be sent by letter and transmitted via facsimile or electronically to the attention of:

Michael Callahan-Dudley
Regulatory Counsel
MARIN CLEAN ENERGY
1125 Tamalpais Avenue
San Rafael, CA 94901
Phone: (415) 464-6045
Facsimile: (415) 459-8095
E-mail: mcallahan-dudley@mceCleanEnergy.org

and

Beckie Menten
Energy Efficiency Director
MARIN CLEAN ENERGY
1125 Tamalpais Avenue
San Rafael, CA 94901
Phone: (415) 464-6034
Facsimile: (415) 459-8095
E-mail: bmenten@mceCleanEnergy.org

There are no restrictions on who may file a protest, but the protest shall set forth specifically the grounds upon which it is based and shall be submitted expeditiously.

MCE is serving copies of this advice filing to the relevant parties shown on the R.13-11-005 service list. For changes to this service list, please contact the Commission's Process Office at (415) 703-2021 or by electronic mail at Process_Office@cpuc.ca.gov.

Correspondence

For questions, please contact Michael Callahan-Dudley at (415) 464-6045 or by electronic mail at mcallahan-dudley@mceCleanEnergy.org.

/s/ Michael Callahan-Dudley

Michael Callahan-Dudley
Regulatory Counsel
MARIN CLEAN ENERGY

cc: Service List R.13-11-005

Attachment A:
MCE Seasonal Savings Pilot Plan

MCE SEASONAL SAVINGS PILOT PLAN

The MCE Seasonal Savings Pilot Plan is structured using the criteria provided in the Ideation Process document[9] that restates and supplements the pilot criteria articulated by the Commission.[10]

1. **A specific statement of the concern, gap, or problem that the pilot seeks to address and the likelihood that the issue can be addressed cost-effectively through utility programs. This statement should include any market research done to support the statement of gap and the solution proposed.**

Customers continue to adopt new consumer electronics products that have a significant impact on their energy use. Programs must be tested that specifically target the energy savings that can be delivered in a more connected world. In addition to the energy efficiency studies leading to a work paper based on energy savings from smart thermostats themselves (i.e. "out-of-the-box" efficiency), it is important to test concepts like Seasonal Savings that help to deliver even more energy savings to customers in a particular geography. This type of energy efficiency service marks a new strategy for delivering energy savings and engaging customers.

The Nest Learning Thermostat has already been proven to save energy out-of-the-box (i.e. customers begin to save energy as soon as they install and begin to use the device). The number of third party M&V studies that have been conducting on the Nest Learning Thermostat, and other smart thermostats, continues to grow. Nest has summarized some of these results, along with data from its own study, in a white paper that is available online.[11] In summary, Nest Learning Thermostats drive savings equal to approximately:

- 10%-12% of heating usage.
- 15% of electrical cooling usage in homes with central air conditioning.

The MCE Seasonal Savings Pilot takes the Nest Thermostat energy savings one step further by providing customers with incremental energy savings throughout a particular heating or cooling season. It does this by making micro set point adjustments to a customer's schedule - after receiving their permission - over a three week period. The result is incremental energy savings and customer engagement. Nest has run this program elsewhere in the United States but not yet in Northern California's unique climate zones. The attached white paper (Attachment B) summarizes the results of Nest's recent Seasonal Savings deployment in Massachusetts. Of note:

- Participants' set points declined by an average of 1.3°F over the course of the three week algorithm.
- Seasonal Savings reduced heating usage by an average of 3.5% over the course of the winter based on a weather-adjusted analysis of run times that included a control group from neighboring states. These savings include the effect of the impact reductions over time.

[9] Ideation Process at p. 8, available online at http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5292.
[10] D.09-09-047 at p. 48-49.
[11] https://nest.com/downloads/press/documents/energy-savings-white-paper.pdf.

This program will help to bolster the California-specific energy savings data available to the broader energy program stakeholder group currently studying energy savings that are driven by smart thermostats like the Nest Learning Thermostats. These current efforts include studies by California's IOUs focused on out-of-the-box efficiency and demand response.

2. **Whether and how the project will address a Strategic Plan goal or strategy and market transformation.**

This project aligns with the following broader goals and strategies:

Document	Section	Description	How Aligned?
CA Energy Efficiency Strategic Plan (LTEESP)[12]	Policy tools for market transformation[13]	Technical Assistance	By remotely configuring customers' thermostat set points, with their permission, this pilot will ensure that customers' knowledge barriers don't hamper the progress of critical efficiency initiatives.
		Emerging Technologies	This pilot will demonstrate the energy saving potential of an innovative strategy (set point configuration) used to optimize an emerging technology (smart thermostats).
	"Big Bold" Energy Efficiency Strategies[14]	All new residential construction in California will be zero net energy by 2020.	This pilot will demonstrate the potential role smart thermostats can play in helping residential customers achieve zero net energy homes.
		Heating, Ventilation and Air Conditioning (HVAC) will be transformed to ensure that its energy performance is optimal for California's climate.	This pilot will shed light on the potential energy savings to be gleaned from making the management of residential HVAC systems "smarter." The pilot will be constrained to MCE's service territory (i.e., the North Bay Area's temperate climate).

[12] LTEESP (January 2011) available at http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5303.
[13] LTEESP at p. 5.
[14] LTEESP at p. 6.

	DSM Coordination & Integration[15]	Energy efficiency, energy conservation, demand response, advanced metering, and distributed generation technologies are offered as elements of an integrated solution that supports energy and carbon reduction goals.	If energy savings are demonstrated through this pilot and funds are made available to administer similar programs in the future, then rebates for smart thermostats could be offered to customers who don't yet have them. Expanding the pool of customers with smart thermostats and acclimating residential customers to the remote control of their devices are two important steps towards enrolling customers in automated demand response programs.
AB 793 (2015)	Section 717	"The commission shall require an electrical or gas corporation to…[d]evelop a program no later than January 1, 2017…to provide incentives to a residential or small or medium business customer to acquire energy management technology for use in the customer's home or place of business….The electrical or gas corporation shall work with third parties, local governments, and other interested parties in developing the program. The electrical or gas corporation shall establish incentive amounts based on savings estimation and baseline policies adopted by the commission….For purposes of this section, 'energy management technology' may include a product, service, or software that allows a customer to better understand and manage	By demonstrating energy savings this pilot will help establish savings estimates and incentive levels for similar programs focused on providing incremental and ongoing energy savings from smart thermostats, and thereby move the State closer to fulfilling the directives outlined in AB 793 regarding providing residential customers with energy management technology.

[15] LTEESP at p. 67-69.

		electricity or gas use in the customer's home or place of business…."	
SB 350 (2015)	Sections 2 & 6	"To double the energy efficiency savings in electricity and natural gas final end uses of retail customers through energy efficiency and conservation."[16] "The targets established in subdivision (c) may be achieved through energy efficiency savings and demand reduction resulting from a variety of programs that include, but are not limited to, the following…(8) Programs of electrical or gas corporations, local publicly owned electric utilities, or community choice aggregators, that achieve energy efficiency savings through operational, behavioral, and retrocommissioning activities…."[17]	This pilot will help the State achieve its goals of doubling energy efficiency savings through the improved operation of previously installed energy management devices.
California Existing Buildings Energy Efficiency Action Plan (EBEEAP)[18]	Consumer-Focused Energy Efficiency, Program Design Enhancement (Strategy 2.2)	"Revamp efficiency program designs to respond better to customer needs and values, as well as industry practice…. Design programs based upon actual, verified performance rather than 'deemed' savings. Design programs to incorporate building operations and behavior."[19]	This pilot is focused on optimizing energy savings in existing buildings through improved operation of previously installed energy management devices.

[16] SB 350, Section 2(a)(2).
[17] SB 350 Section 6(d).
[18] EBEEAP (September 2015) available at http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-05/TN205919_20150828T153953_Existing_Buildings_Energy_Efficiency_Action_Plan.pdf.
[19] EBEEAP at p. 2.

3. **Specific goals, objectives and end points for the project (end points should clearly state how this project is expected to be scaled up in the portfolio or modify an existing offering in the portfolio)**

Goals:

- Study the impact of deployable energy efficiency in California's northern bay area climate zones.
- Engage customers with an energy program on an ongoing basis (i.e. in successive seasons) to deliver persistent savings.
- Deliver incremental energy savings above and beyond that provided by the smart thermostat device itself.

End Points:
Two distinct end points exist for this program. The first comes after the completion of the Winter 2016/17 heating season in which Seasonal Savings will be deployed. At that point, a report on the heating energy savings will be prepared. The second end point will come after the completion of the Summer 2017 season, at which point a report of the cooling savings will be prepared.

Scaling:
After successful completion of the two reports mentioned above, this program can quickly scale to all Nest Thermostat customers in MCE's service area, which is a base that continues to grow. As such, the program will continue to grow as the Nest install base grows, driven in the future by incentives and rebates for additional smart thermostat programs.

Key Performance Indicators (KPIs):

- % of eligible customers opting in to the program should be greater than 50%.
- Energy savings should exceed 1.5% of HVAC usage.

Additional Metrics of Interest:

- Average temperature set point change of treatment vs. control, which is illustrative of the change driven by the algorithm.
- Total number of participants who opted out of the program.

4. **New and innovative design, partnerships, concepts or measure mixes that have not yet been tested or employed.**

Nest's Seasonal Savings program is a novel software service that can be delivered to residential customers to increase the energy savings delivered by their smart thermostat. Nest has deployed Seasonal Savings to customers in other parts of North America, but has not yet deployed the algorithm in a climate similar to the northern Bay Area. As such, this is a first-of-its-kind pilot.

5. **A clear budget and explanation of funding source.**

Item	Budget	Funding Source
Program Implementation Cost (Nest Contract)	$40,000	MCE Single Family Program
MCE Staff Costs	$20,000[20]	MCE Single Family Program
Total Budget	**$60,000**	MCE Single Family Program

The EM&V budget and funding source will be determined in coordination with Energy Division staff. MCE is interested in the possibility of leveraging other evaluation work to limit the expense associated with evaluating this pilot. MCE currently does not have access to EM&V funds. Energy Division staff has expressed an interest in ensuring the study is completed, but additional discussion is needed to resolve the question. MCE is filing this advice letter now in order to ensure the possibility that the pilot can launch to customers this winter. Once the budget and funding source for the EM&V study is determined, MCE will file a supplemental advice letter to provide those additional details. The EM&V Plan is provided below in Section 13.

6. **Program performance metrics or non-resource objectives and success criteria**

See KPIs in item number 3.

7. **Timeframe to complete the project and obtain results within a portfolio cycle (subject to R.13-11-005 Phase 2 determination) - projects should not be continuations of programs from previous PAs portfolios.**

- First season = Winter, 2016/17
- Second season = Summer, 2017
- In this case, the end of a season is defined by the point at which the weather changes such that most customers no longer require significant heating or cooling load (i.e. the beginning of a shoulder season).

8. **Information on relevant baselines metrics or a plan to develop baseline information against which the project outcomes can be measured.**

- See KPIs in item number 3.
- Program participants must have a Nest Learning Thermostat installed at the time of program deployment. Savings will be measured relative to customers who have a Nest Learning Thermostat but are not enrolled in the Seasonal Savings program.

[20] Assuming 25% of a full-time equivalent employee.

9. **A concrete strategy to identify and disseminate best practices and lessons learned from the pilot project to all California utilities and to transfer those practices to programs, as well as a schedule and plan to expand the pilot project to utility and hopefully statewide usage, including expected funding source for the planned new program or program modification if known.**

MCE and Nest will work together to submit a draft report and hold a workshop/webinar to share results of the pilot. MCE will leverage its relationships with other emerging community choice aggregators, local government agencies and community benefits organizations to try and ensure that the program activities, if deemed successful, are repeated and scaled. Assuming the pilot demonstrates cost-effective savings, the expected funding source for expanding Seasonal Savings and other similar programs would be Commission administered EE funds collected from ratepayers. Importantly, any recommendations for future program design or work paper development will be technology neutral, as opposed to recommending the Nest technology specifically.

10. **PA staff project manager and assigned EM&V liaison- names and contact info.**

Name	Title	Role	Contact Info
Daniel Genter	MCE Program Specialist	MCE project manager	dgenter@mcecleanenergy.org
Beckie Menten	MCE Director of Customer Programs	MCE secondary contact	bmenten@mcecleanenergy.org
Jeremy Battis	Local Government and Regional Initiatives Statewide Lead Analyst at the Commission	Energy Division lead	jeremy.battis@cpuc.ca.gov
Peter Franzese	Regulatory Analyst at the Commission	Energy Division secondary and EM&V lead	peter.franzese@cpuc.ca.gov

11. **Ex-Ante Review data collection form (see last slide in this deck)**

The project savings claims are based solely on evaluated *ex post* savings, thus no *ex ante* showing is needed at this time.

12. **Methodologies to test the cost-effectiveness of the project.**

The pilot will utilize a standard total resource cost ("TRC") calculation. Of particular interest in the model will be the Net-to-Gross ("NTG") value. Because customers cannot purchase Seasonal Savings on their own (i.e. it must be delivered by an energy partner), MCE proposes a NTG of 100% for this program (i.e. by definition, no customers would have done this on their own without the program).

13. A proposed EM&V plan and PCG plan

EM&V Study Approach

Nest's Seasonal Savings algorithm deployment lends itself very well to the Intent-to-Treat ("ITT") EM&V approach, a style of Randomized Control Trial ("RCT"), because three groups are naturally created by the deployment:

1. A control group consisting of Nest Thermostat owners in MCE service area to whom the algorithm is *not* deployed.
2. A treatment group consisting of Nest Thermostat owners in MCE service area to whom the algorithm *is* deployed, which is broken into two groups:
    a. Customers who accept the deployment and participate in Seasonal Savings
    b. Customers who decline the deployment and do not participate in Seasonal Savings

M&V Plan

Part 1: Pre-Deployment

The Nest team will set up the deployment of Seasonal Savings to ensure that the Intent-to-Treat strategy can be used. To do so, the Nest team will take the following steps:

1. Identify all eligible Nest Thermostats within MCE's service area
2. Separate the devices into two groups: treatment and control
    a. These groups will be created randomly to facilitate the RCT component of the ITT methodology
    b. The relative sizing of the groups will be mutually agreed upon by the Nest and MCE teams (e.g. it can be evenly split 50/50, weighted toward treatment, etc).
3. Nest then deploys Seasonal Savings to the treatment group

Part 2: Post-Deployment

Following the deployment of Seasonal Savings, Nest will provide the EM&V vendor individual thermostat data (without personally identifiable information) to facilitate the evaluation of set point/runtime differences between the treatment and control groups. Nest will also analyze the data and offer insights, including a preliminary calculation of savings.

Example of the ITT Strategy and its Benefits

1. Assume, for this example, that there are 5,000 potential Seasonal Savings participants in the MCE service area
2. Withhold the algorithm deployment from a portion of those eligible customers, assume 1,000 customers
3. Deploy the algorithm to the remaining 4,000 customers
4. A portion of the 4,000 will opt-in, assume 70% opt-in
5. As a result of the opt-in, 2,800 participants run the algorithm

6. This creates 3 distinct groups:
    - 1,000 randomized control group customers for whom the offer and algorithm were withheld
    - 1,200 customers who chose not to allow the algorithm to run
    - 2,800 customers who ran the algorithm
7. Allows us to measure the unbiased treatment effect (i.e. we can measure against a group who would have received the offer under normal circumstances). These three customer groups now allow us to measure the savings of intending to treat, rather than just of treating, which eliminates even the selection bias that can occur in a standard RCT (i.e. standard RCTs even have selection bias because you aren't able to know which customers wouldn't have run an algorithm or service)

MCE will discuss the pilot and EM&V Plan with the Residential Project Coordination Group ("PCG") 2. Any changes to the EM&V Plan that result from the discussion with the Residential PCG-2 will be included in the supplemental advice letter filing referred to above.

14. Proposed Peer Review Group ("PRG") (or list of leads to engage in proposal development/project tracking. May include industry, advocates, etc.)

This pilot does not require a PRG.[21]

15. Any other relevant information requested by Commission staff to support review.

No other information was requested by Commission staff.

[21] Energy Efficiency Policy Manual, Version 5, July 2013, Section XX at p. 40-41, available at http://www.cpuc.ca.gov/NR/rdonlyres/7E3A4773-6D35-4D21-A7A2-9895C1E04A01/0/EEPolicyManualV5forPDF.pdf.

Attachment B:
Nest Seasonal Savings
Massachusetts Department of Energy Resources
Impact Evaluation

Executive Summary

The Massachusetts Department of Energy Resources contracted with Nest Labs in December 2014 to deploy Nest's Seasonal Savings algorithm to all Nest customers in Massachusetts in January 2015 with the goal of reducing residential energy usage in the winter of 2015. This report provides an analysis of the energy savings achieved by the algorithm.

Seasonal Savings offers Nest customers a way to improve the efficiency of their thermostat settings by making small adjustments to the programmed set points over a three week period and learning when and by how much the set points could be adjusted without impacting comfort.

The key findings of the evaluation include:

- A total of 20,104 thermostats completed the Seasonal Savings algorithm – equal to 54% of all eligible thermostats in Massachusetts
- Participants' set points declined by an average of 1.3°F over the course of the three week algorithm
- About half of the initial set point reduction was taken back by the end of the winter. The extreme weather and snow-related school and business closings appear to have adversely affected the impacts.
- Seasonal Savings reduced heating usage by an average of 3.5% over the course of the winter based on a weather-adjusted analysis of run times that included a control group from neighboring states. These savings include the effect of the impact reductions over time.
- The heating savings are estimated to have reduced energy bills by $21 per thermostat and $44 per customer, yielding aggregate savings of $427,000. These savings only include impacts from mid-January 2015 through April 2015. They do not include any future savings and also exclude other smaller sources of savings from customers who dropped out and from ancillary electric use of heating systems.

The evaluation found that Seasonal Savings was an effective approach for reducing heating energy use cost-effectively. The savings potential may be larger in winters with less extreme weather.

Program Participation

Nest identified 37,586 thermostats in Massachusetts for potential algorithm deployment. Customers must have an active Nest account; have activated their Nest thermostat by December 25, 2014 (to have sufficient time to develop a schedule); and must have heating controlled by the thermostat. Customers were offered Seasonal Savings on their thermostat (and app) and had to opt-in to participate. The offer was sent out to the thermostats on January 12, 2015. A total of 20,104 thermostats completed the Seasonal Savings process and opted to keep their new schedule. Table 1 summarizes the participation process.

Table 1. Seasonal Savings Participation

Participation	# Thermostats	% of Thermostats
Total Population Sent	37,586	100%
Not Received (not on-line)	1,904	5.1%
Did Not Qualify (primarily devices not in heating mode)	3,108	8.3%
Did Not Opt-In	10,555	28.1%
Exited Early	1,915	5.1%
Completed Seasonal Savings	**20,104**	**53.5%**

About 13% of the targeted customers either did not receive the offer or did not qualify to participate. Overall, 28% of the customers (32% of those qualified) did not choose to participate. About 85% of those who opted to participate completed the Seasonal Savings algorithm.

The timing of the Seasonal Savings algorithm proved to be challenging. The algorithm ran from January 12th through early February[22]. Massachusetts experienced record snowfall with multiple major storms and numerous days of school and business closings. The two biggest storms of the season occurred on January 27th and February 2nd -- both during the three week Seasonal Savings algorithm period. Three more major snow events occurred between February 8th and 15th. These record storms altered occupancy patterns and likely had an adverse impact on the Seasonal Savings algorithm's ability to identify more

[22] 90% of thermostats completed the algorithm by February 5th and 99% completed by February 10th

efficient set point schedules. The extreme weather also may have led customers to revert back toward less efficient set points during the remainder of the winter.

Analysis Methods

Nest employed two primary analysis approaches to assessing the energy savings from Seasonal Savings.

- The first approach compares customer schedules before and after running Seasonal Savings and calculates the average change in set point. This change in set point temperature is then multiplied by the estimated heating savings per degree change in set point that has been empirically determined by large scale data analysis Nest has performed on the climate zone level. A second comparison is performed using the set points from 8 weeks after the algorithm finished to assess the longevity of the impacts.
- The second approach is similar to a standard pre/post billing data analysis used for energy efficiency program evaluation – analyzing daily run time as a function of weather. The analysis included two methods – a customer level pre/post weather normalized usage analysis and a pooled regression modeling approach that also explored adjustments for snowfall and Away mode.

The set point approach has the advantage of being directly observable for all customers and, given the short time frame, would not typically require a control group to adjust for population trends -- although the extreme weather led that to not be the case in this instance. The disadvantages include the uncertainty in the relationship between set point changes and heating run-time (which varies by customer and by the timing and magnitude of the changes) and that the approach ignores the impacts of Away mode and manual adjustments to set points -- only looking at changes in the schedule.

The run time approach has the advantage of directly analyzing the outcome of interest -- the run time of the heating system -- and doesn't depend on a model of how set points affect seasonal heating use and implicitly includes the impact of all set point adjustments. The main disadvantages of the run time approach are that the relationship between run time and outdoor temperature may not be well determined for some thermostats and that run time varies with factors other than outdoor temperature (e.g., wind, solar gain, occupancy pattern changes due to holidays and snow storms, etc.) and so the approach requires a control group, which may not be readily available or well matched.

Control Group

A control group[23] was selected to estimate how set points and run time would have changed without Seasonal Savings. For the set point analysis, a control group may not be required in most cases since customer schedules tend to change gradually over time. But due to the extreme weather in Massachusetts during the algorithm deployment and over the rest of the season, we included a control group for both analyses.

The Seasonal Savings algorithm was run for all eligible customers in Massachusetts and so the control group needed to be drawn from other states. We used Nest customers in all adjacent states (RI, NH, CT, VT, NY) that were located in counties that border Massachusetts. To better match the control customers to the participants, we divided Massachusetts into 5 regions: Boston & South Shore, North Shore, Cape, Central, and West. The control group for each region was created from Nest customers in bordering counties of neighboring states.

Table 2. Regions and Control Group

Region	Massachusetts Counties	Control Counties
Boston / South Shore	Bristol, Norfolk, Plymouth, Suffolk	Providence RI
North Shore / NE	Essex, Middlesex	Hillsborough NH, Rockingham NH, York, ME
Central	Hampden, Hampshire, Worcester	Cheshire NH, Hartford CT, Tolland CT, Windham CT,
Western	Berkshire, Franklin	Bennington VT, Columbia NY, Litchfield CT, Rensselaer NY, Windham VT
Cape/Islands	Barnstable, Dukes, Nantucket	Bristol RI, Newport RI

The control group differed from the participants in several respects, even within region. There were differences in pre period average set points that were mostly traceable to differences in heating fuels (more bulk fuel in control group) and the use of Away mode (e.g., vacation homes on the Cape). For the run-time analysis we stratified the population on these factors to better match the control customers to the participants.

Findings: Set Points Approach

The set point analysis was based on comparing participant's schedules immediately before and after running the Seasonal Savings algorithm and also analyzing the schedule 8 weeks later to assess the short-term persistence of the changes. Prior Nest analysis had estimated

[23] Technically speaking it's a comparison group. "Control group" is for use in a randomized control trial.

that each 1°F change in heating set point should reduce heating energy use by 4% for homes in Massachusetts. Table 3 summarizes the set point analysis results for customers that completed Seasonal Savings and for the control group.

Table 3. Heating Savings: Set Point Changes °F

	SS Participants	Control	Net Difference
Average set point before SS	65.10	64.58	0.52
Average set point after SS	63.82	64.65	-0.83
Average set point after 8 weeks	64.57	64.74	-0.17
Average set point change	**-1.29**	**+0.06**	**-1.35 ±0.03**
Average set point change after 8 weeks	**-0.52**	**+0.14**	**-0.67 ±0.04**
Estimated Savings: initial	5.2%	-0.2%	5.4%
Estimated Savings: after 8 weeks	2.1%	-0.6%	2.7%
Estimated Savings: Average over period	3.6%	-0.4%	4.0%

The average heating set point declined by 1.29°F (±0.02°F) after Seasonal Savings. The control group set point increased by an average of 0.06°F (±0.02 °F), implying a net 1.35°F set point reduction for participants. At 4% savings per degree set point, heating savings of 5.4% would be expected. But 8 weeks after Seasonal Savings the net set point reduction was only half as large and so estimated savings dropped to 2.7%. Assuming a linear decline over the 8 weeks, average savings are estimated at 4.0% of heating use for the period (or 4.2% if weighted by degree days).

For Seasonal Savings customers that exited early, a comparable analysis found an average set point reduction (net of control group) of 0.61°F immediately after SS and 0.19°F at the end of 8 weeks, leading to estimated average savings of 1.6% (2.4% declining to 0.8%).

The distribution of average set point changes for participants that completed Seasonal Savings is shown in Figure 1 (excluding about 1% of cases with more extreme changes).

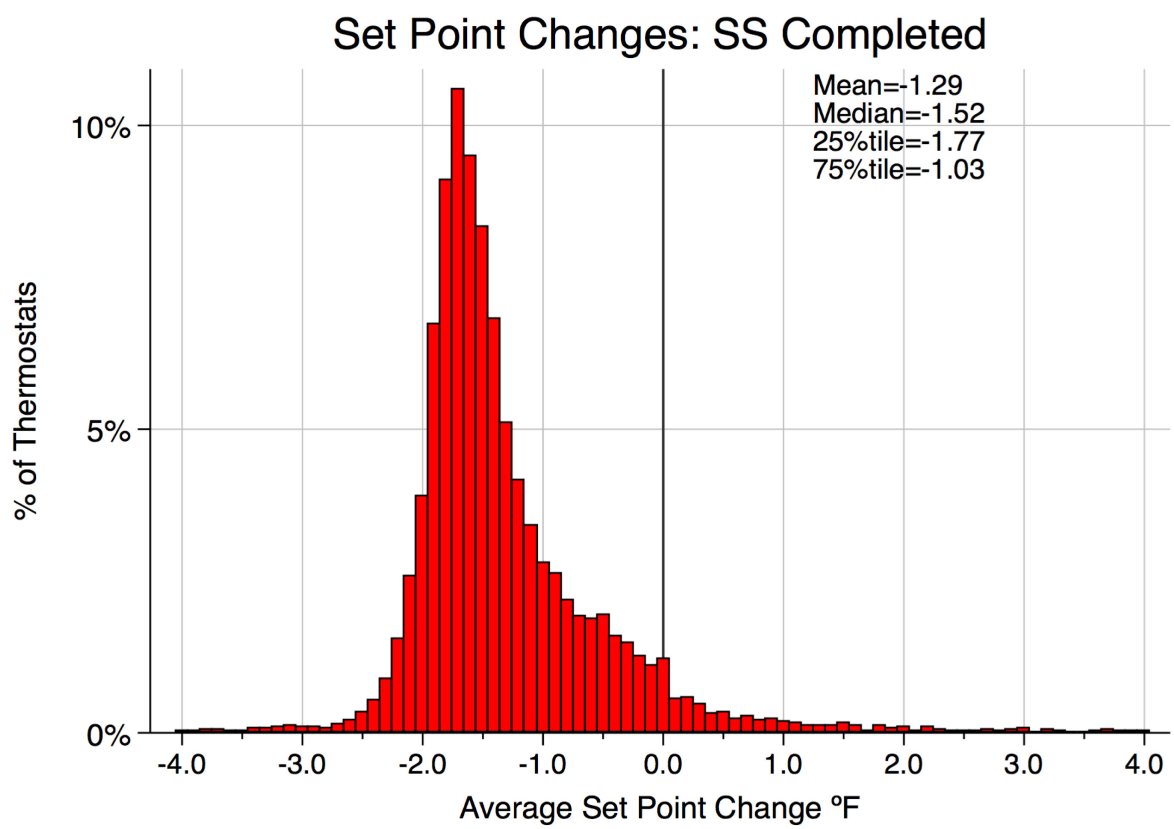

Figure 1. Distribution of schedule set point changes after Seasonal Savings

The plot shows that the most common change in set point was about a 1.7°F reduction but the distribution is skewed right leading to a mean value lower than the median or mode.

Figure 2 repeats this histogram but changes the vertical scale so that it can be compared to a histogram for the control group using the same scale..

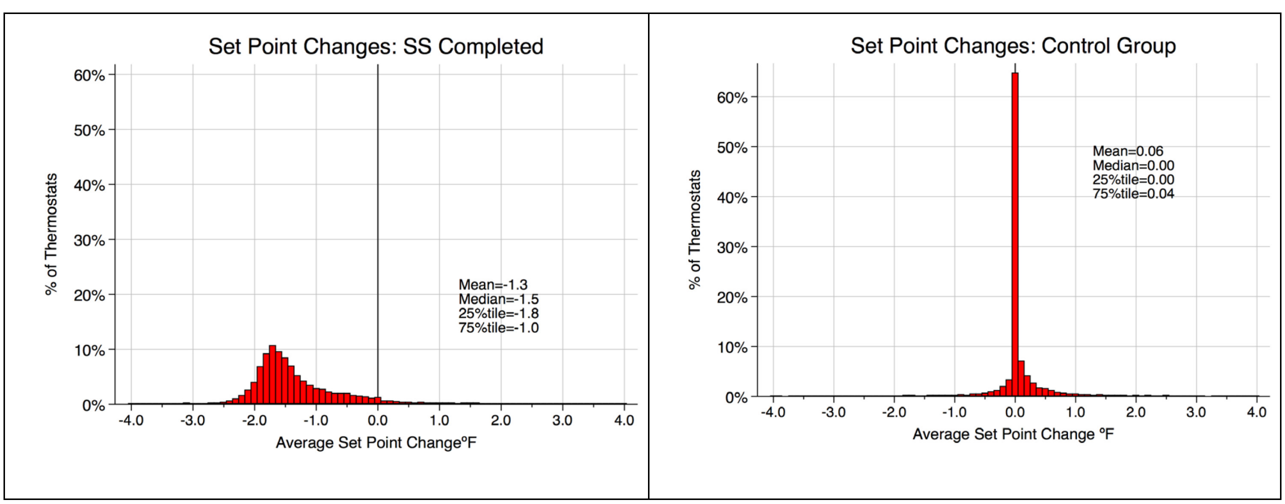

Figure 2. Distribution of schedule set point changes vs. Control Group

The spike at zero for the control group shows that more than 60% of the control group had essentially no change in average set point over the period. There is no segment of the control group that experienced the large set point changes found among participants—showing that self-selection could not explain the large shift in set points over the period.

Figure 3 shows the distribution of set point changes 8 weeks after Seasonal Savings.

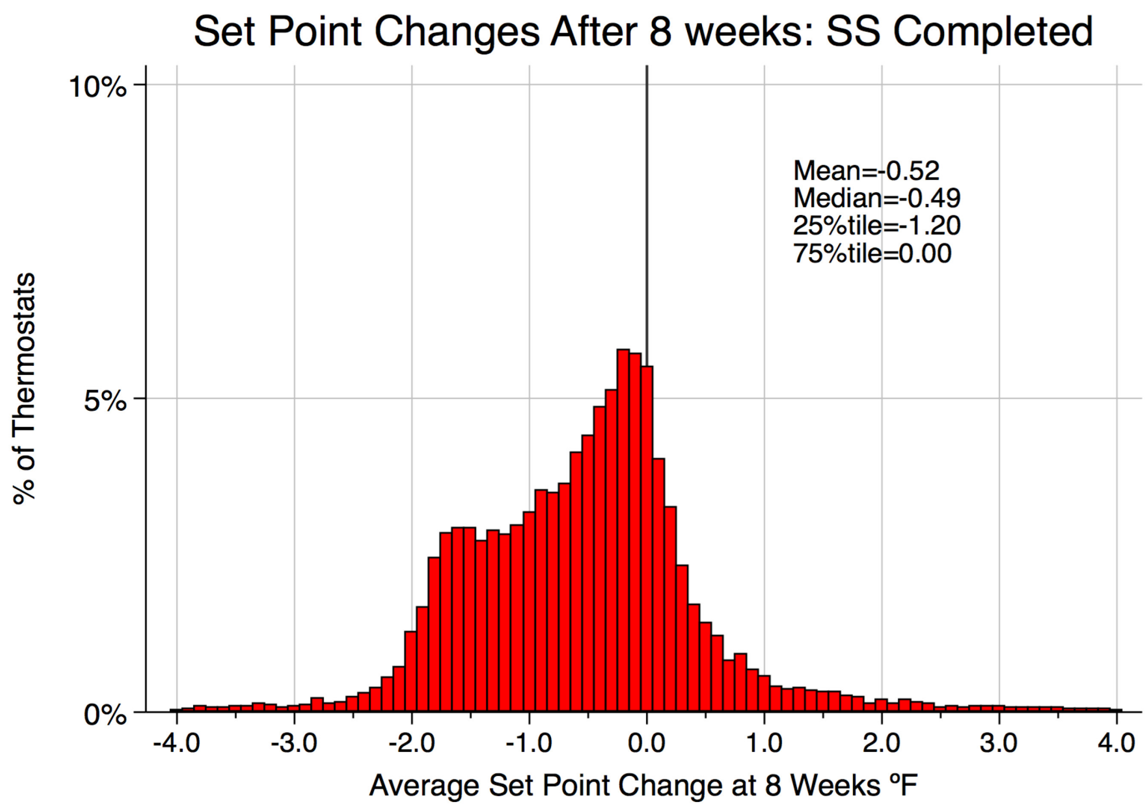

Figure 3. Distribution of schedule set point changes 8 weeks after Seasonal Savings

The distribution shape changed as some customers have apparently reverted back to something close to their old schedules while a significant fraction maintained their new schedules. The control group distribution appeared about the same although the mean set point change increased to 0.14°F.

The hourly profile of the immediate set point changes is shown in Figure 3.

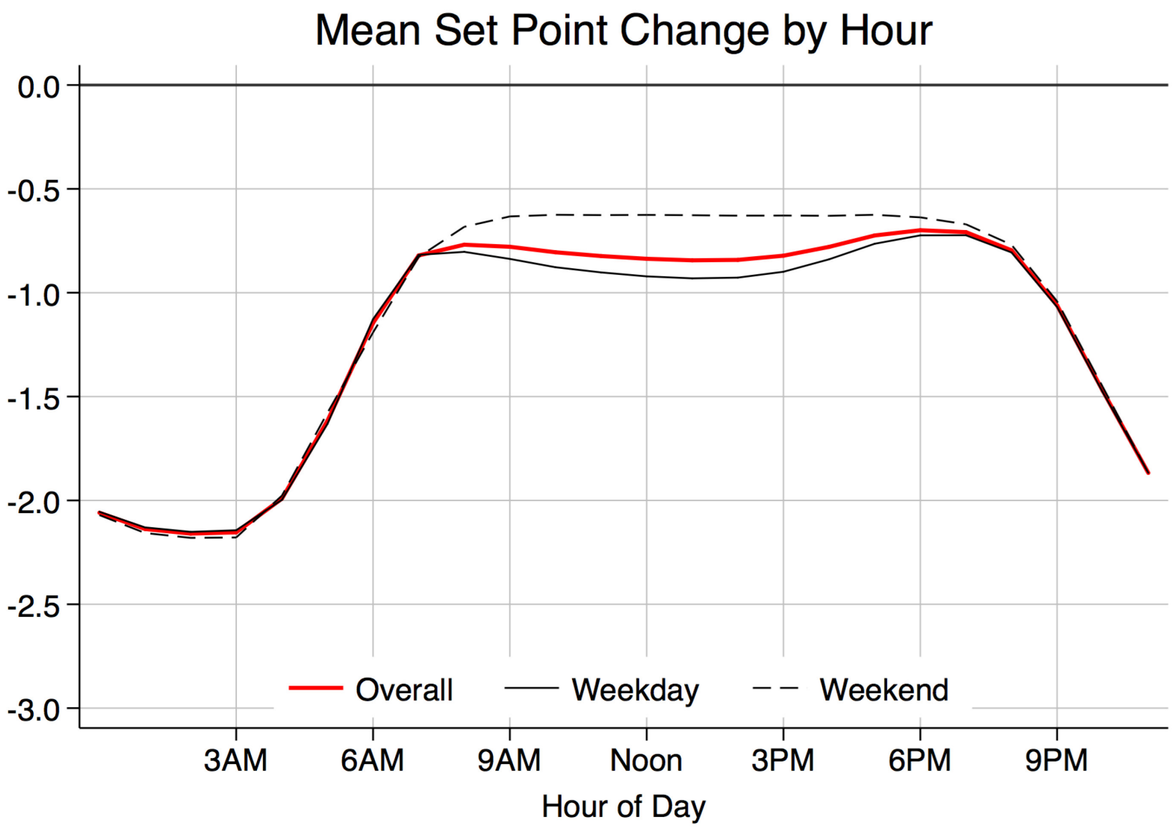

Figure 3. Mean set point changes by hour of day

The plot shows that set point reductions averaged more than 2°F during the night and less than 1°F during the middle of the day. The night setback changes were similar for weekdays and weekends but the daytime reductions were larger on weekdays than weekends -- an expected finding. The smallest changes in set points occurred when people were waking up in the morning and in the prime evening hours. The Seasonal Savings algorithm captures the largest set point improvements at times when they have the least impact on comfort.

A more detailed look at the set point changes is provided in Figure 4, which is the same data as presented in Figure 3, but also shows the distribution of the changes in set point for each hour using a box plot. The plot shows the mean change as the horizontal black line on each box and shows the median as the white break between the red boxes. The red boxes extend out to the 25th and 75th percentiles. The lines extend out to the 10th and 90th percentiles.

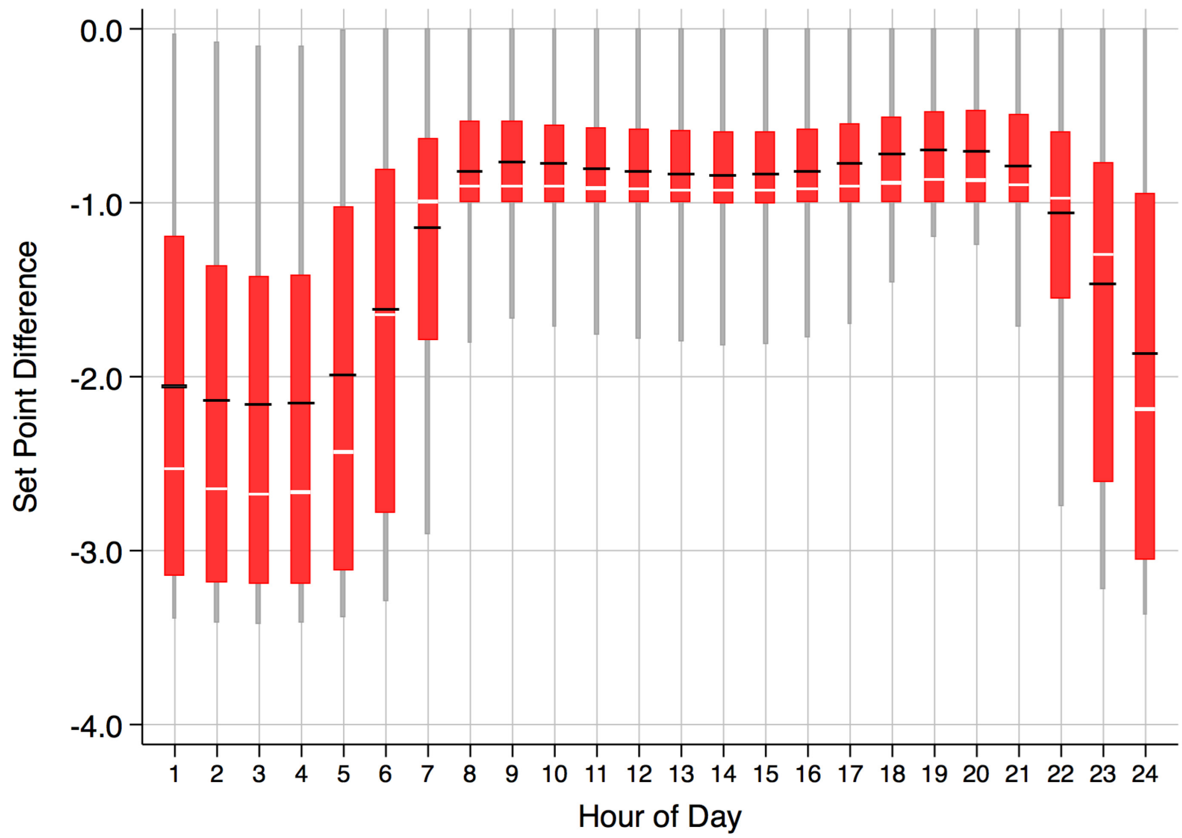

Figure 4. Distribution of set point changes by hour of day

The plot shows how the typical (median) temperature reductions are more than 2.5°F at night and just below 1°F during the day. The lower bound 10th percentiles show that the period of 6PM - 8PM has the least flexibility in set points -- the 10th percentile line barely extends below the -1°F line.

Set Point Changes Over Time

We analyzed the changes in the set point schedules over time in greater detail to better understand the apparent decline in algorithm impacts.

Figure 5 plots the heating schedule set points over the course of this past winter for three groups of customers: Seasonal Savings participants, customers who opted not to participate in Seasonal Savings or dropped out prior to completion, and a control group of customers from neighboring states. The graph shows data for the North Shore region (Northeastern MA and adjacent counties in NH and ME) region. The set points plotted are a 7-day moving average (the average of the prior 7 days for each date). The blue points along the top of the graph show the dates of snowstorms in Eastern Massachusetts.

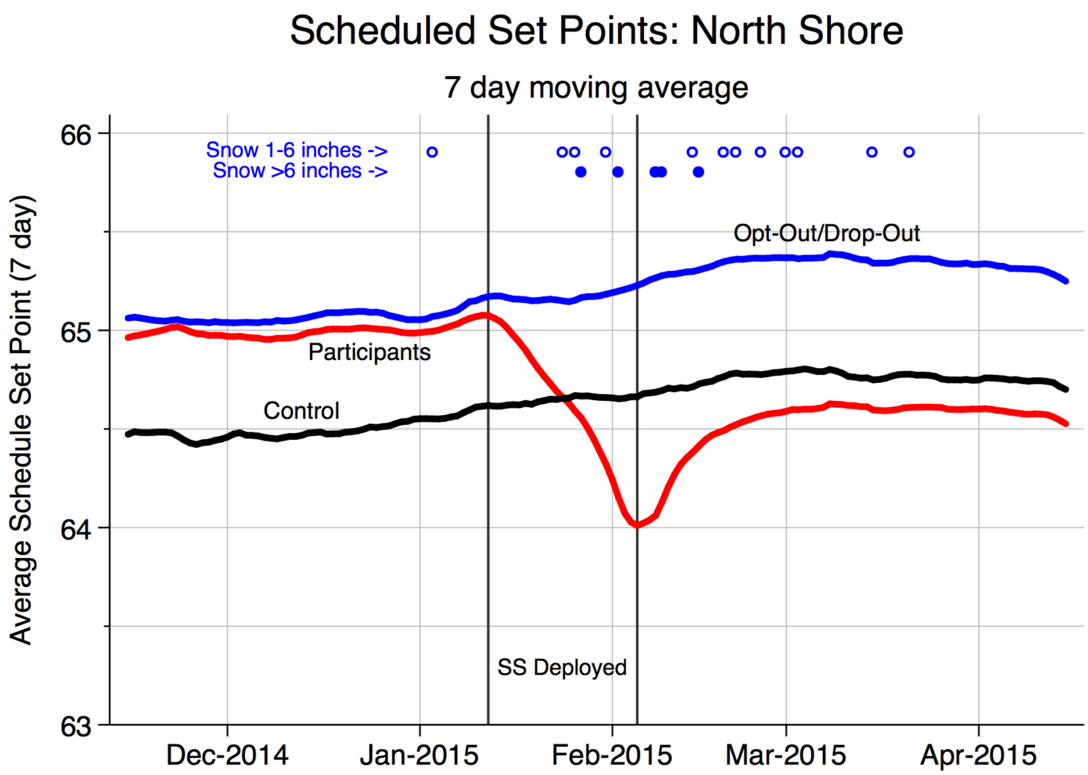

Figure 5. Scheduled Set Points Over Time: North Shore

Prior to deployment of Seasonal Savings, the Massachusetts customers had higher set points than the control group by about a half degree. The participants then show a clear drop of more than 1°F during the algorithm deployment and then a fairly significant increase in the few weeks after Seasonal Savings finished – giving back about half the gains. During this same period the control group and the opt-out groups both experienced gradual but clear increases in set points. The graph show similar behavior over time for the control group and the opt-out group, suggesting that the opt-out group may have served as a viable control group.

A few weeks after the algorithm ran, the set points had stabilized for all three groups, implying that any degradation in impacts occurred quickly and then leveled out. A key question is what role the multiple major snow storms played in suppressing the impact of Seasonal Savings and especially in the set point increases in the following few weeks.

Figure 6 explores the changes in greater detail -- plotting the change in set point for each date compared to the same day seven days prior (therefore accounting for day of week variations).

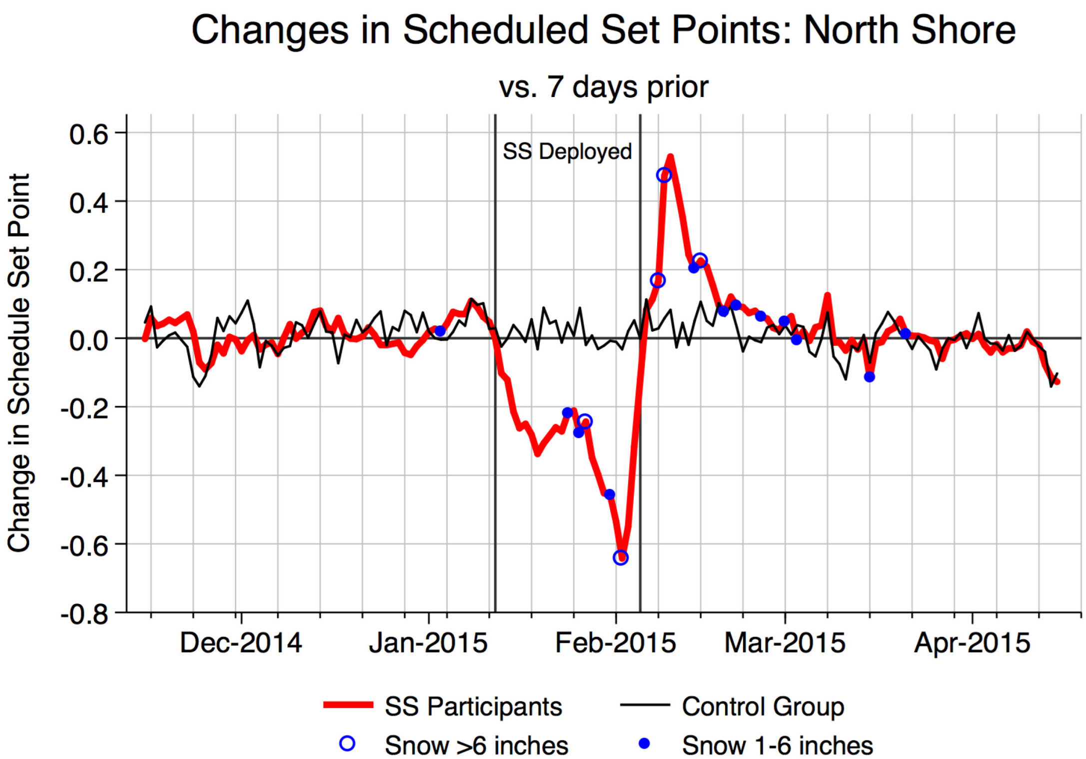

Figure 6. Change in Scheduled Set Point vs. 7 days prior

For clarity, this plot only shows participants and the control group and snowstorms are shown as symbols on the line. It appears that snowstorms may have reduced the algorithm impacts (snow coinciding with the stutter in the set point declines around the middle of the deployment) and also contributed to the reversion in set points shortly after the algorithm completed. After about two or three weeks, participant set point changes settled down and became similar to the control group. The post-deployment decline in algorithm impacts was immediate and short lived, suggesting no further on-going degradation in savings after the initial couple of weeks. Other regions showed similar.

Data from next winter will be needed to confirm that the remaining savings persist, but it appears that they may have based on this data.

Run Time Analysis

The run-time based analysis employed two methods that are each based on standard billing data analysis approaches – a house-level pre/post treatment/comparison weather normalization and a pooled fixed effects econometric analysis. The house level analysis provides useful insights into savings variability but the pooled model is easier to replicate, involves fewer analytical decisions, and can potentially account for the impacts of snowfall and Away mode on run time.

Findings: House Level Run Time Analysis

The house level weather normalization analysis employed a variable-base degree day ratio estimation. Ratio estimation results were screened for reliability based on having at least 10 days of data in the pre and post treatment periods and having a reasonable model fit as indicated by a CV(RMSE) of less than 65%. In addition, a small fraction of cases with extreme changes in usage were classified as outliers (% change in usage greater than 2.5 interquartile ranges from the median percent change in usage). The data screening caused about 25% overall attrition, with the vast majority due to the CV(RMSE) requirement.

An initial analysis was performed based on the standard definition of the post-treatment period as starting when the algorithm deployment finished. This analysis found a net 3.5% reduction in run time, equal to 29 hours in annual runtime reduction. But the significant changes in set points in the few weeks after deployment suggests that this annualized savings value may over-state actual impacts. The ratio estimation was repeated with the post-treatment period starting on the day the algorithm deployed so that the full savings over the course of the winter could be assessed. The impacts for the actual post treatment period through the end of April 2015 were then calculated based on these results. The analysis is summarized in Table 4.

Table 4. Heating Savings: Run-Time Analysis VBDD ratio estimation

		Annual Runtime (hours/year)			
Group	**# T-stats**	**Pre**	**Post**	**Savings**	**%Savings**
Seasonal Savings	14,883	826	776	50	6.1% ±0.4%
Control Group	7,442	797	773	23	2.9% ±0.6%
Net Annual Savings				**27 ±6**	**3.2% ±0.7%**
Net Savings Jan 2015 – Apr 2015				**17.4 ±3.6**	**3.2% ±0.7%**

Note: ± values are 95% confidence intervals on the means

Weather-adjusted annualized run-time for the Seasonal Savings participants declined by 50 hours but the control group experienced an average 23 hour reduction yielding a net savings estimate of 27 hours per year. These savings equal 3.2% of heating use. The savings actually achieved from deployment through the end of April are estimated at 17 hours of run time based on the actual weather experienced.

Savings were estimated to be a little larger for homes with gas heat compared to those with other types of heat (3.6% vs. 2.3%) but the difference was not statistically significant.

Participants in the analysis had an average of 1.9 Nest thermostats per home. Overall, 58% of participants had one Nest thermostat, 28% had two thermostats, and 14% had three or more thermostats. The estimated net savings were larger for homes with two or more thermostats -- averaging 32 hours of run time per thermostat (3.8% ±1.0% heating savings). Based on available customer-reported data, home size averaged 2,572 sq.ft. overall but was 1,811 sq.ft. for homes with one thermostat compared to 3,016 sq.ft. for homes with multiple thermostats (2,558 sq.ft. for homes with two thermostats, and 3,610 sq.ft. for homes with three or more thermostats).

The 3.2% savings reported in Table 4 are a little less than the 4.0% savings reported in Table 3 from the set point analysis averaged over the 8 weeks. But this difference should be expected given two potential sources of over-estimation in the set point analysis -- being based solely on schedule set points (omitting the impact of Away mode and manual adjustments) and the larger set point reductions at night (which may save less than 4%/°F since night set back temperatures aren't always binding).

Findings: Pooled Run Time Analysis

The pooled run time analysis involved using a single regression model of the daily run time for all participants and control group customers. This type of pooled modeling is commonly employed in billing data analysis studies. Two different model specifications were analyzed:

1. a base model that fit daily heating run time as a function of heating degree days (HDD base 60°F), and indicator variables for participation and for the post treatment period and interactions between degree days and participation and also the post treatment period.
2. An expansion of the base model to include variables for snowfall and for time spent in Away mode and an interaction between Away mode and HDD60. Away mode was considered an exogenous factor unrelated to Seasonal Savings participation. The purpose of the expanded model was to account for additional factors expected to affect heating run time and develop more precise estimates.

The models were fit using a fixed-effects regression model that included thermostat-specific effects. Differences in the relative size of the control group for each region and the potential for different impacts in different regions led to fitting a separate model for each region and then combining the estimated impacts based on the size of the participant population in each region.

The models defined the pre and post treatment periods as before and after January 12, 2015 – just as in the ratio estimation approach. The inclusion of the algorithm deployment period should lead to slightly lower percent savings but capture a greater overall level of savings. The results of this analysis are summarized in Table 5. The detailed regression modeling output is shown in Table 6.

Table 5. Heating Savings: Run Time Analysis Pooled Fixed Effects

		Analysis Sample Size		% Heating Savings	
Region	% Pop	Participants	Device-Days	Base Model	Full Model
Boston & South Shore	34.3%	6,645	1,343,505	4.0% ±0.4%	4.0% ±0.4%
North Shore /NE	46.2%	9,501	2,057,098	2.5% ±0.3%	2.9% ±0.3%
Central	9.2%	1,900	735,816	4.3% ±0.4%	4.2% ±0.4%
Western	1.8%	246	427,004	-1.9% ±1.4%	-1.1% ±1.4%
Cape/islands	8.5%	923	300,106	5.9% ±0.9%	5.2% ±0.9%
Total	**100%**	**19,215**	**4,863,529**	**3.4%** ±0.4%	**3.5%** ±0.4%

Table 6. Pooled Fixed Effects Model Output

	Boston/ S Shore		North Shore / NE		Central		Western		Cape/Islands	
Model specification->	Basic	Full	Basic	Full	Basic	Full	Basic	Full	Basic	Full
# observations	1,343,505	1,343,505	2,057,098	2,057,098	735,816	735,816	427,004	427,004	300,106	300,106
SS customers	6,645	6,645	9,501	9,501	1,900	1,900	246	246	923	923
Control Customers	1,860	1,860	3,572	3,572	2,798	2,798	2,502	2,502	974	974
Coefficients / t-stats										
hdd60	0.1728	0.1838	0.156	0.1666	0.1671	0.1758	0.1561	0.1744	0.1615	0.1788
	286.15	305.19	357.94	381.2	338.88	350.39	212.04	226.28	158.53	173.94
hdd60_treat	-0.0008	-0.0005	0.0182	0.0155	-0.0008	-0.0019	0.0148	0.0081	0.0079	0.0094
	-1.12	-0.79	35.64	30.88	-1.11	-2.47	5.76	3.34	5.42	6.69
Post	-0.0167	-0.0151	0.0337	0.0347	0.1495	0.1399	-0.0472	0.0278	-0.2519	-0.2192
	-0.87	-0.8	2.21	2.32	9.16	8.68	-1.75	1.09	-8.05	-7.25
post_treat	0	-0.0024	0.013	-0.003	0.0432	0.0325	0.2919	0.2788	-0.0696	-0.1173
	0	-0.11	0.74	-0.18	1.68	1.28	3.09	3.13	-1.55	-2.71
post_hdd60	-0.0006	-0.0012	-0.0052	-0.005	-0.0035	-0.0032	-0.0022	-0.0022	0.0112	0.0102
	-0.82	-1.7	-10.21	-9.98	-6.07	-5.64	-2.58	-2.7	9.1	8.52
post_hdd60_treat	-0.0063	-0.0062	-0.0044	-0.0045	-0.008	-0.0075	-0.0061	-0.0069	-0.0068	-0.0039
	-7.76	-7.85	-7.45	-7.63	-9.01	-8.55	-2.07	-2.5	-3.77	-2.24
awayhrs		0.0124		-0.0007		0.0078		-0.0625		-0.0364
		17.37		-1.15		7.79		-52.38		-29.79
awayhrs_hdd60		-0.003		-0.0025		-0.0026		-0.0024		-0.0026
		-121.78		-135.53		-80.03		-73.69		-62.62
snowfall		-0.0007		-0.0037		-0.0084		-0.0108		0.0391
		-0.72		-5.27		-4.63		-3.23		11.68
constant	-0.3555	-0.3846	-0.4317	-0.398	-0.5017	-0.5032	-0.7175	-0.0491	-0.3632	-0.0499
	-50.5	-50.95	-70.61	-61.64	-48.4	-46.05	-33.76	-2.12	-21.94	-2.66

Both pooled models estimated that Seasonal Savings reduced heating usage by about 3.5% -- very close to the 3.2% found from the house level ratio estimation approach. The addition of the snowfall and Away mode variables barely affected the overall estimated savings but did reduce the variance in estimates across regions – implying that the estimates are more reliable.

The estimated savings varied by region, but the estimates for the Western and Cape/Island regions were based on fairly small samples with larger uncertainty and only represent about 10% of the overall participant population.

The run time savings for this past winter were calculated using the actual elapsed heating degree days and days. The resulting estimate is a 15.1 hour reduction in run time – a little less than the 17.4 hours estimated from the ratio estimation approach. The slightly higher percent savings yet slightly lower absolute hours savings can be explained by differences in the sample composition and weighting – the ratio estimation sample is about 25% smaller primarily due to screening criteria on the thermostat-specific model fit.

Peak Day Impacts

One of the goals of the analysis was to estimate the impacts of Seasonal Savings on peak day gas throughput. We used the pooled model results to estimate the savings on the ten peak days of heating system run time in the post treatment period. Heating system run time on these ten peaks days ranged from 7 to 9 hours and averaged 7.6 hours. For the 14,756 gas heated homes, the aggregate reduction in peak day gas use is estimated at 305 Mcf and ranged from 282 Mcf to 361 Mcf.

Fuel and Cost Savings

The three analysis methods provided fairly consistent estimates of the impacts of Seasonal Savings – 3.2%-3.5% for the run time analysis results and about 4.0% for the analysis based on set points. Considering the potential biases and the advantages and disadvantages of each approach, we believe the pooled fixed effects estimate using the full model is the best estimate to use for the overall savings. Converting this estimate into fuel and cost savings requires making assumptions about system fuel input rates and appropriate energy costs.

We estimated an average heating system input rate of 80,000 Btu/hour based on data from a recent evaluation of the Massachusetts High Efficiency Heating Equipment program[24]. As a cross check, we calculated the implied annual gas heating usage using this input rate and the 826 hours of average annualized run time from the ratio estimation, yielding 661 therms per thermostat. This value is about 13% less than the 760 therm annual household average natural gas use estimate on the DOER web site[25] but it makes sense given the frequency of multi-system homes.

[24] see p.53 in http://ma-eeac.org/wordpress/wp-content/uploads/High-Efficiency-Heating-Equipment-Impact-Evaluation-Final-Report.pdf

[25] see http://www.mass.gov/eea/energy-utilities-clean-tech/misc/household-heating-costs.htm

We used the same 80 Kbtu/hr estimated input for all fuels, although it is likely an under-estimate for oil (equal to just 0.58 gph).

For the few homes with electric heat pumps, we assumed an overall seasonal efficiency of 2.5 COP and adjusted the Btu input accordingly. For energy costs, we estimated $1.55/therm of natural gas, $3.13/gallon of heating oil, $3.09/gallon of propane, and $0.15/kWh of electricity based on data from the DOER web site.

Table 7 summarizes the fuel and cost savings based on these heating system input rates and energy costs and using the 2015 run time savings of 15.1 hours from the pooled model.

Table 7. Fuel and Cost Savings: Winter 2015

		Savings/Unit		Savings/Home		Aggregate Savings	
Fuel	**% Units**	**Fuel**	**$**	**Fuel**	**$**	**Fuel**	**$**
Natural Gas (therms)	73.4%	12.1	$18.72	25.0	$38.76	178,257	$276,297
Oil (gals)	20.7%	8.7	$27.20	18.3	$57.12	36,096	$112,982
Propane (gals)	3.4%	13.0	$40.14	31.2	$96.33	8,748	$27,031
Electric (kWh)	2.6%	142	$21.24	256.3	$38.45	73,455	$11,018
Total	**100%**		$21.26		$44.47		$427,329

The overall savings is estimated at about $21 per thermostat, $44 per customer and more than $400,000 in aggregate.

The fuel and cost savings reported don't include three more sources of additional savings:

- savings that occurred (or will occur) after April 2015
- savings for customers who opted in to Seasonal Savings but exited early (although they showed some set point reductions)
- savings in electricity consumption of fuel-fired heating systems due to furnace fans, boiler pumps, and other electric use. These savings may have been about $1 per thermostat.

The overall savings from these factors may be significant relative to the savings reported in Table 7.

Further Observations

In addition to the issue of excluding savings after April 2015 and from early exit customers, there are two other factors that may have limited the savings from this specific deployment of the Seasonal Savings algorithm:

1. The record setting snowfall and associated school and business closings during this past winter coincided with the algorithm deployment and may have reduced the impacts from Seasonal Savings and contributed to the decline in savings over time.
2. The algorithm wasn't deployed until January 12^{th} and ran through early/mid February, limiting the savings to about half the winter. If the algorithm had been deployed at the start of December, the savings for this winter would have been about 40% larger than the 15 hours reported here.

CALIFORNIA PUBLIC UTILITIES COMMISSION

ADVICE LETTER FILING SUMMARY
ENERGY UTILITY

MUST BE COMPLETED BY LSE (Attach additional pages as needed)

Marin Clean Energy

Utility type:	
☑ ELC ☐ GAS	Michael Callahan-Dudley
☐ PLC ☐ HEAT ☐ WATER	Phone #: 415-464-6045
	E-mail: mcallahan-dudley@mceCleanEnergy.org

EXPLANATION OF UTILITY TYPE

ELC = Electric GAS = Gas
PLC = Pipeline HEAT = Heat WATER = Water

(Date Filed/ Received Stamp by CPUC)

Advice Letter (AL): 17-E

Subject of AL: Request for Approval of MCE Seasonal Savings Pilot Program

Tier Designation: ☐ 1 ☑ 2 ☐ 3

Keywords (choose from CPUC listing):

AL filing type: ☐ Monthly ☐ Quarterly ☐ Annual ☑ One-Time ☐ Other ______________________________

If AL filed in compliance with a Commission order, indicate relevant Decision/Resolution: D.09-09-047

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL ______________________________

Summarize differences between the AL and the prior withdrawn or rejected AL[1]: ____________________

Resolution Required? ☐ Yes ☑ No

Requested effective date: September 18, 2016 No. of tariff sheets:

Estimated system annual revenue effect: (%):

Estimated system average rate effect (%):

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected:

Service affected and changes proposed[1]:

Pending advice letters that revise the same tariff sheets:

Protests and all other correspondence regarding this AL are due no later than 20 days after the date of this filing, unless otherwise authorized by the Commission, and shall be sent to:

CPUC, Energy Division
Attention: Tariff Unit
505 Van Ness Ave.,
San Francisco, CA 94102
EDTariffUnit@cpuc.ca.gov

Utility Info (including e-mail)
Marin Clean Energy
Michael Callahan-Dudley, Regulatory Counsel
(415) 464-6045
mcallahan-dudley@mceCleanEnergy.org

[1] Discuss in AL if more space is needed.