

Pilot Programs Plan: Assessing Monetary and Nonmonetary Incentives to Increase the Collection of Mercury Added Thermostats in California

Presented to

California Department of Toxic Substances Control
(DTSC)

Submitted by

Thermostat Recycling Corporation*
(TRC)

Prepared by

S. Groner Associates, Inc.
100 West Broadway, Suite 290
Long Beach, CA 90802
(562) 597-0205

August 8, 2016



Scope of Pilot Project Plan

The Pilot Project Plan is a one year effort to test out two components of the overall program, which include: (1) testing a variety of monetary incentives to determine their effect on increasing the collection of thermostats in California and (2) testing a variety of nonmonetary incentives to determine types of messages that will most effectively influence individuals who come in contact with thermostats to bring them to a proper collection facility. This testing will be conducted via A/B split testing via online platforms statewide to assess the most effective messaging to move California residents to action and increase overall collection rates.

Note, through the course of this Plan we will refer to individual efforts within the Plan as projects and the overall TRC collection effort as the Program.

Pilot Project Goals

1. **Devise pilot projects that assess the effectiveness of monetary and nonmonetary incentives** in increasing the number of thermostats collected, and improving messaging that influences behaviors of individuals that come in contact the mercury thermostats.
2. Provide data-based findings from pilot projects that will refine and enhance TRC's ongoing outreach efforts throughout the state.

Pilot Project 1: Monetary Incentives - Retail Collection Pilot

Background

In designing our monetary incentive pilot project, we reviewed efforts implemented throughout the country that involved monetary incentives. We reviewed both voluntary programs and mandated programs, including a meta-analysis of voluntary programs by the Product Stewardship Institute.¹ Our review revealed that the state of Vermont realized a significant impact from its incentive program.² Its retail collection model was first implemented from October to November of 2007, and offered an immediate financial incentive of \$5 in-store credit per mercury thermostat at 86 participating hardware stores. Vermont retailers collected 1,200 mercury thermostats in two months, and the program achieved a 45% increase in collection rates after the first two years. The Vermont program revealed the importance of (1) providing immediate financial incentives, as opposed to delayed incentives leading to less successful collection results, and (2) promoting the convenience and accessibility of recycling mercury thermostats at local hardware stores. It also should be noted that Vermont had in place a ban on the disposal of these thermostats even prior to these programs, which aided in this effort.

We believe the Vermont model is the best approach for testing monetary incentives in California. However, in moving forward with this approach, it must be noted that Vermont retailers are required by law to actively participate in its education and outreach collection program. No mandatory participation is required from California retailers.³

¹ "Lessons Learned: Voluntary Mercury Thermostat Take-Back Programs Guide." May 1, 2016

² "Report on the Collection and Recycling of Mercury-Added Thermostats." March 2008.

³ V.S.A. §7116 (b) (2)

The monetary incentive pilot project will use Vermont's collection program as a model. It will focus on three key aspects of their program:

1. Providing immediate financial incentives to consumers and/or contractors for returning mercury thermostats;
2. Partnering with retail hardware or home improvement stores as a convenient location for consumers and/or to collect thermostats;
3. Using the \$5 rebate/in store credit as the starting point for testing incentive amounts.

Pilot Program Design

Tested Incentives

In testing the following monetary incentives in retailers throughout the state of California, we aim to provide data on what an appropriate dollar amount per recycled mercury thermostat might be. The central aim of this pilot program is to provide guidance on what amount motivates collection beyond what is already being collected. We realize that while the \$5 amount seems to have worked effectively in states like Vermont and Illinois, the state of California is far larger and more diverse than other states.

We propose the following financial incentives in the form of immediate in-store credit/coupons targeted at consumers and contractors within select hardware stores:

- Control or null hypothesis value: \$0/mercury thermostat (at existing retailers throughout California)
- \$2.50/mercury thermostat
- \$5.00/mercury thermostat
- \$10.00/mercury thermostat

We will use three locations in separate regions of the State (southern, central and northern California) to test these amounts. Each location will test a single amount assigned, so as not to cross contaminate data within a region. We will select locations based on partner stores available and locations that based on the criteria outlined below, reflect locations that have a higher than average likelihood of harboring mercury thermostats in the community. We will also look to select cities with similar socio-economic backgrounds so that the incentives between locations can be compared.

Tactics

The following tactics will be implemented by TRC to initiate and maintain a robust Retail Collection Pilot that engages participating retailers, aims to increase overall collection rates, and provides insights on what the appropriate financial incentive amount should be for TRC's California program:

- Contact regional sales representatives and store managers to initiate store partnerships;
- Develop promotional materials toolkit for retail partners (i.e. posters and signs, bin signage, point-of-purchase shelf talkers, bag stuffers);
- Finalize partnerships with hardware stores and place bins and materials in store;
- Provide training materials to employees/store managers;
- Conduct single day collection events at stores to promote retail collection program, obtain more specific market survey data from participants and increase collection numbers;
- Promote participating retailers by adding partner links to the TRC microsite;

- Use Google ads to drive consumers to retail collection sites based on key search terms;
- Monitor and analyze pilot program results;
- Prepare a program modification plan.

Metrics

- Number of thermostats collected per store
- Number of in-store incentives redeemed
- Survey of participants in the collection day events to assess how customers heard about the pilot program⁴

⁴ In order to redeem the in-store credit incentive, customers will be asked to fill out a brief in-store survey that will assess how they heard about the pilot program. This information will provide us with a better understanding of the most effective ways to disseminate information to our target audience in the future.

Implementation Schedule

Pilot 1: Retail Collection Pilot		2016				2017							
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Tactics													
Contact regional sales representatives and store managers to initiate store partnerships	1 month												
Develop promotional materials toolkit for retail partners (i.e. posters and signs, bin signage, point-of-purchase shelf talkers, bag stuffers)	1 month												
Finalize partnerships with hardware stores and place bins and promotional materials in store	1 month												
Conduct employee trainings and provide training materials to manager	1 month												
Promote participating retailers by adding partner links to the TRC microsite	1 month												
Use google ads to drive consumers to retail collection sites based on key search terms	9 months												
Conduct two "Double Incentive Day" collection events per store to promote retail collection program and increase collection numbers	2 months												
Monitor and analyze pilot program results	9 months												
Prepare a program modification plan	2 months												

Location Criterion

In order to target residents and contractors that are most likely to come into contact with mercury thermostats, we have established a set of criteria to identify locations in which we recommend our retail collection pilot program take place. Upon evaluation, age of structure and household income are predictive factors of substantial mercury thermostat presence. Given the social and economic ramifications of these variables, we determined that specific locational dynamics likely exist. Focusing on areas that may have a substantial mercury thermostat presence increases the likelihood of mercury thermostat collection because target personnel have a greater probability of both interactions with and

understanding of the material. As a result of our preliminary research and input from DTSC, the four criteria for determining a recommended city for significant outreach efforts and pilot projects are: 1) Age of Structure, 2) Income, 3) Temperature fluctuation, and 4) Population size. The recommended target locations are based on the following outreach demographic and related criteria:

- **Age of Structure.** Mercury thermostats were used to control heating and cooling systems beginning in the 1950s. A legislative push for energy efficiency in California in the 1980s started a downward trend in the popularity of mercury thermostats in favor of thermostats that could be programmed and thus more energy efficient. By the early 1990s, electronic thermostats with digital sensors began to establish a stronger market position given their affordability and greater utility. By 2006, AB 2347 prohibited the sale of mercury thermostats. Given this timeline, it is not clear exactly how quickly these mercury thermostats were phased out from being included in new home construction or how rapidly their share of the aftermarket sales declined. It is equally difficult to know how long mercury thermostats remained in use before replacement. Given these unknowns, we will focus on implementing pilots in areas with a sizable proportion of houses built prior to the 1980s. This would focus on homes that were built with mercury thermostats. However, in discussions with DTSC, we will calibrate this assumption by also looking at TRC collection data in the target cities to determine if the collection trend is increasing or decreasing (i.e., with the assumption that an increasing collection trend equates to the existence of potentially more mercury thermostats in the area). According to the US Census Bureau, in 2014 more than 61% of California homes were built before 1980; SGA used this benchmark as a guide in evaluating and assessing selected cities of California.
- **Income.** Lower middle income class households likely have the capacity to purchase homes but are restricted in their ability to make improvements to their properties including their heating and ventilation systems. In addition, households in this income group that do not own homes, but instead live in rented homes or apartments are more likely to be in units with centralized heating or cooling systems (than lower income households); again we assume that at a lower income rental price point, landlords would be less likely to have upgraded the system since installation. Likewise, we assume that other targets such as commercial buildings and hotels will also follow the same trends of mercury thermostat presence due to the level of economic activity in such areas and the resulting revenue and profit margins. SGA will observe areas that have a sizable proportion of lower middle income class residents. The Pew Research Center defines the lower middle income class as those with an annual income between \$40,127 and \$60,190 for the state of California. SGA examined the annual income distribution of California and established that the average proportion of lower middle income class was 31.2% at the county level. Geographic areas with a lower middle income class greater than or equal to the established mean were chosen as potential targets.
- **Temperature fluctuation.** Based on conversations with DTSC, California inland cities were preferred (i.e., greater than 50 miles from the coast) in order to account for areas that have greater temperature fluctuations and as a result more likely to need HVAC systems relative to coastal regions with less significant temperature fluctuations (note: originally Oakland was considered as an alternate location, however, it was subsequently removed based on its coastal location).
- **Population size.** To increase likelihood of finding mercury thermostats, the research looked at cities/regional areas with a population size greater than 100,000 for the analysis; our basis is that

areas with less than 100,000 in population consequently are less likely to have a critical mass of the 14 target audiences that we need to reach.

City Selection

Based on the outreach demographic criteria above, we have highlighted three cities that are examples of the types of cities that fit well within our criteria and would be the type of cities/store locations we would propose for the pilot project with a retail partner. Each outreach location was selected from a different geographic region in California—**Stockton** is highlighted as a potential northern California city, **Fresno** is highlighted as a potential central valley city, and **San Bernardino** is highlighted as a potential southern California city. Only cities with a population size greater than 100,000 and located farther than 50 miles from the coast were initially screened as potential locations.

Retail Store Selection

We also reviewed and mapped out the major hardware/home-improvement stores for potential partnerships. Below are some of the considerations (pros and cons) of finding the right partnership to implement a successful pilot project.

Large Retailers: Home Depot and Lowe's Home Improvement

- Pros: Larger customer base and more store availability in various Californian regions
- Cons: Less personal ownership than smaller stores to actively promote incentive program⁵ and potentially more difficult to establish partnerships with due to large company structure

Medium Retailer: Orchard Supply Hardware

- Pros: Large customer base and representative of a medium sized home-improvement stores; currently participating in several EPR (extended producer responsibility) take back programs with U-Waste products.
- Cons: Fewer store locations in selected Californian regions (i.e., no store in San Bernardino and around 50 stores in California vs. over 100+ with the other chains)

Small Retailers: Ace Hardware and TrueValue Hardware

- Pros: Proven track record of success from other states' pilot programs (i.e. Vermont, Maine, Illinois, etc. partnered with Ace and TrueValue for their pilot programs)
- Cons: Smaller customer base and franchise store model

⁵ Phone call with Karen Knaebel, Program Coordinator of State Standard Program in Vermont on 7/26/16.

Figure 1: Potential Partner Locations in Stockton Area⁶

Stockton Hardware Stores

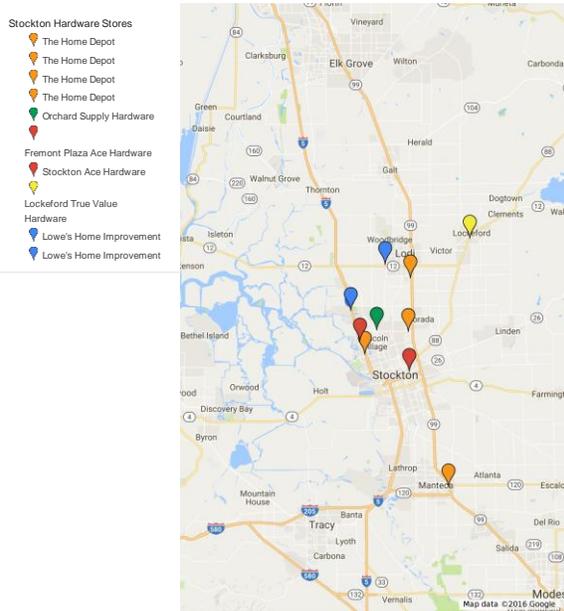


Figure 2: Potential Partner Locations in Fresno Area⁷

Fresno Hardware Stores

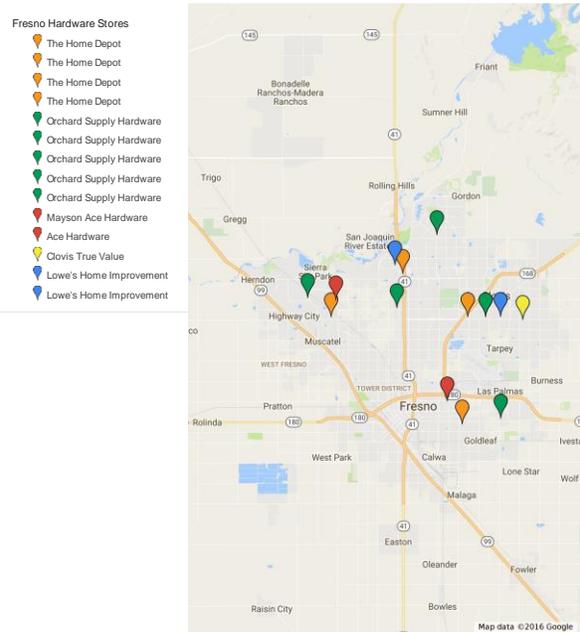
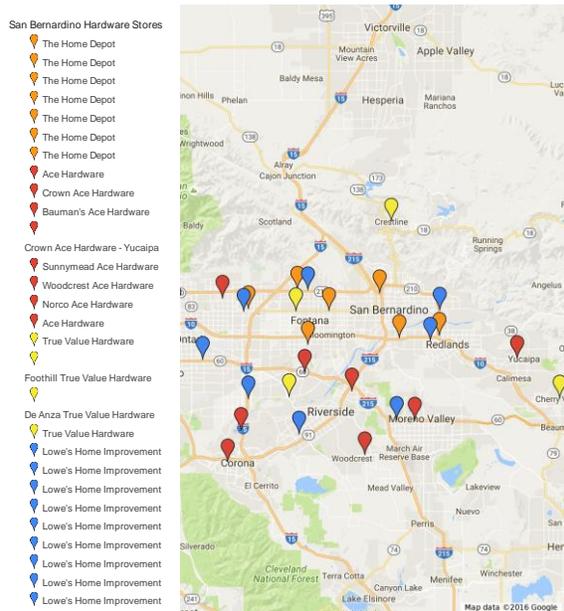


Figure 3: Potential Partner Locations in San Bernardino Area⁸

San Bernardino Hardware Stores



⁶ View Stockton map: https://www.google.com/maps/d/u/0/edit?mid=11yOehs0vtr0fHOlsY1cfHmYr_NM

⁷ View Fresno map: https://www.google.com/maps/d/u/0/edit?mid=1gBC6IAmzqJQGhknInXwgOr_HLA

⁸ View San Bernardino map: <https://www.google.com/maps/d/u/0/edit?mid=1bjCdULNy67dJ9pI5QKg9moV0jdU>

Pilot Project 2: Non-Monetary Incentives - Outreach Messaging Pilot

Background

While various pilot programs have tested the use of financial incentives to spur increased collection rates, we have little data on how nonmonetary incentives and messaging strategies contribute to TRC's goals. Although the role of nonmonetary incentives may be perceived as less important or urgent as financial incentives because they can seem more subjective and difficult to track, we know that long term shifts in sustainable behavior require changing people's minds and perceived social norms through effective outreach and messaging.⁹

Through using A/B split testing via online media and social media to assess the reception of different messages devised to promote proper recycling habits and reduce illegal disposal among Californian residents, we can come to a substantiated understanding of what messages stick in our audiences' minds and motivate them to action. Understanding what messages motivate California residents to take action and recycle their mercury thermostats will enable TRC to maximize its impact with a finite budget by strategically tailoring its outreach strategy and messaging to prompt new public perceptions and norms around improper mercury thermostat disposal.

Pilot Project Design

Types of Messaging

The messages we will test will be drawn from established best practices within the marketing/social sciences field and characteristics of successful mercury collection programs from other states. One of the key psychological models often turned to in developing marketing communication pieces is Maslow's "Hierarchy of Needs."

Maslow's Hierarchy of Needs

Using this psychological construct helps highlight conceptual ways that advertisers/marketers approach an individual's interests and attempt to align them with the objectives of the program via aligned interests/messaging. The four basic interests that messages are focused on are the following concepts:

1. Safety/Health Protection
2. Belonging/Social Norms
3. Esteem/Self-Interests (including monetary self-interests and convenience)
4. Self-Actualization/Aspiration (including broader community and environmental interests beyond the self)

Note, usually the base interest (physiological) is too immediate and not used in most advertising/marketing efforts.

By using online and social media A/B testing, we can evaluate multiple variations of messages to determine the best fit message for our audience. The messages we will evaluate will draw from the following four categories:

⁹ James, Rachel. "Promoting Sustainable Behavior: A guide to successful communication."

1. Health/Safety: Recycling mercury thermostats is essential to the health of one's community, family, children, etc;
2. Legal/Social Norm: Improper disposal of mercury thermostats is against the law and/or proper disposal is what contractors and consumer/do-it-yourselfers do;
3. Incentive/Convenience: Recycling mercury thermostats is free and/or offers financial incentives at participating locations;
4. Environmental/Aspirational: Recycling mercury thermostats is good for the planet and part of making our world a better place.

Tactics

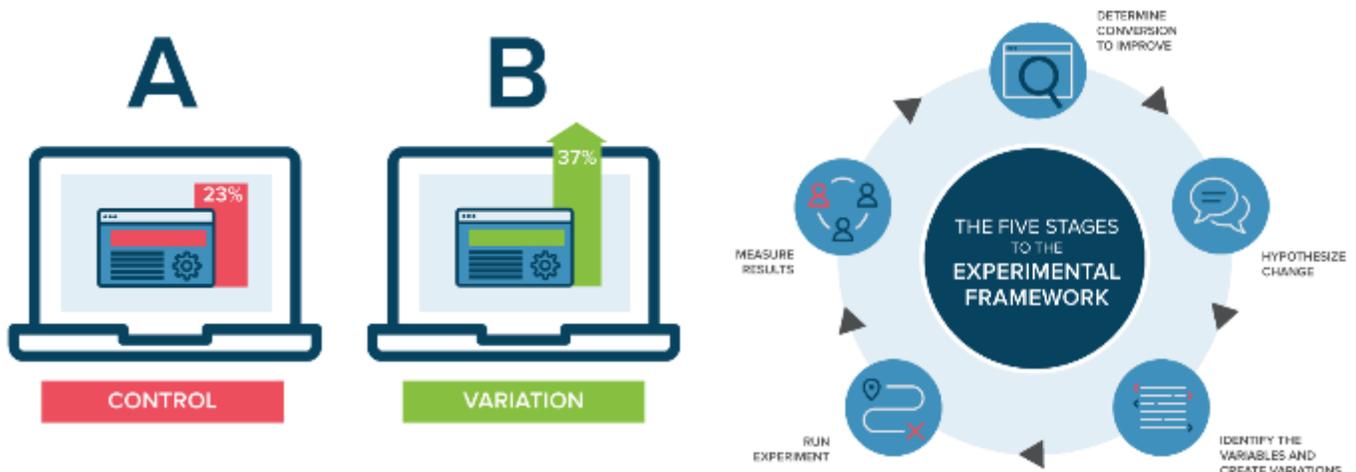
In testing the ads, we will develop simple posts which we can refine over time based on audience feedback. We will use two metrics to determine success:

1. The number of people that see the ads and then click through to the landing page for thermostat collection (this determines general interest).
2. The number of people that then input a location in the collection site locator (this determines intent – one step closer to action).

The steps we will then take in implementing the A/B testing are the following:

1. Assess current messaging approaches to various target audiences;
2. Identify priority audiences and develop specific messages to test for selected audiences;
3. Test messages through A/B split testing via Facebook ads and Google ads;
4. Measure conversion results and identify winning messages based on the public's reception;
5. Incorporate winning message into larger outreach strategy through the program modification plan.

Figure 4: A/B Split Testing Framework¹⁰



Pilot Project Metrics

- A/B split test conversion rates from Google Ads and Facebook Ads

¹⁰ "Optimizely: Optimize Digital Experiences for Your Customers." *What Is A/B Testing?* N.p., n.d. Web. 20 July 2016.

- Conversions to goal of input location in site locator
- Total microsite visits based on test messages
- Participation in Collection Day Events at participating retailer locations

Implementation Schedule

Pilot 2: Outreach Messaging Pilot		2016				2017							
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Tactics													
Assess current messaging approaches to various target audiences;	1 month												
Identify priority audiences and develop specific messages to test for selected audiences;	1 month												
Test messages through A/B split testing on Facebook ads and Google ads;	9 month												
Measure conversion results and identify winning messages based on the public's reception;	9 month												
Incorporate winning message into larger outreach strategy through the program modification plan.	2 month												

Sources

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), Action control: From cognition to behavior. Berlin, Heidelberg, New York: Springer-Verlag. (pp. 11-39).

Arvey, Richard D. (2009) "Why Face-to-Face Business Meetings Matter." Business School, National University of Singapore.

Clean Water Action (2013) "Turning Up the Heat II: Exposing the Continued Failure of the Manufacturers' Thermostat Recycling Program, <http://mercurypolicy.org/wp-content/uploads/2013/04/turninguptheheatii-final3.pdf>."

Clean Water Action (2010) "Turning Up the Heat: Exposing the Continued Failure of the Manufacturers' Thermostat Recycling Program, <http://mercurypolicy.org/wp-content/uploads/2010/02/turning-up-the-heat-3.pdf>."

Comprehensive list of all of the regionally and nationally accredited 4-year colleges and universities in California.

Consent Order Deadlines (Eff. Date Feb. 10, 2016)

Department of Resources Recycling and Recovery, "CalRecycle Review of the Thermostat Recycling Corporation's 2015 Annual Report for DTSC, May 14, 2015."

DTSC Executed Consent Order, Effective February 10, 2016

Keppel, Geoffrey and Wickens, Thomas D. (2004) *Design and Analysis: A Researcher's Handbook*, 4th Edition. New Jersey: Pearson Prentice Hall.

King, Bruce M. and Minium, Edward W. (2008) *Statistical Reasoning in the Behavioral Sciences*, 5th Edition. New Jersey: John Wiley and Sons, Inc.

Maine Department of Environmental Protection, "Report on the Collection and Recycling of Mercury-Added Thermostats." March 15, 2008.

"Mercury Thermostat Manufacturers - Proposed Recycling Program Enhancements," Presented to DTSC on April 22, 2015.

"Optimizely: Optimize Digital Experiences for Your Customers." *What Is A/B Testing?* N.p., n.d. Web. 20 July 2016.

Northeast Waste Management Officials' Association (NEWMOA), "Review and Assessment of Thermostat Recycling Activities in the Northeast." June 2008.

Product Stewardship Institute, "Lessons Learned: Voluntary Mercury Thermostat Take-Back Programs." May 1, 2016.

James, Rachel. "Promoting Sustainable Behavior: A guide to successful communication." *UC Berkeley Office of Sustainability*. August 2010.

Sarno, Steven, and Lauren Hopkins (2015) "The rise of mandatory product stewardship programs." *Trends* (15339556) 46, no. 6: 11-13. Academic Search Complete, EBSCOhost.

TRC, "HVAC Distributor Engagement: Mercury Thermostat Compliance, http://www.thermostat-recycle.org/files/uploads/White_Paper_HVAC_Nationwide_Engagement_March_2016.pdf.

TRC, "2014 Mercury Recovery Index, http://www.thermostat-recycle.org/files/uploads/2014_Mercury_Recovery_Index.pdf."

TRC, "2010 TRC Annual Report, http://www.thermostat-recycle.org/files/mediacenter/2010_California_TRC_Annual_Report.pdf."

TRC, "2011 TRC Annual Report, http://www.thermostat-recycle.org/files/mediacenter/2011_California_Annual_Report.pdf."

TRC, "2012 TRC Annual Report, http://www.thermostat-recycle.org/files/mediacenter/2012_California_Report.pdf."

TRC, "2013 TRC Annual Report, http://www.thermostat-recycle.org/files/uploads/2013_CA_TRC_Annual_Report_no_appendix_final.pdf."

TRC, "2013 California Report: Appendix F-H, http://www.thermostat-recycle.org/files/uploads/Appendix_F-H.pdf."

TRC, "Appendix I, http://www.thermostat-recycle.org/files/uploads/Appendix_I.pdf."

TRC, "Appendix_J_CSLB_Forms, http://www.thermostat-recycle.org/files/uploads/Appendix_J_CSLB_Forms.pdf."

TRC, "Appendix_K_Form_990, http://www.thermostat-recycle.org/files/uploads/Appendix_K_Form_990.pdf."

TRC, "2014 TRC Annual Report."

TRC, "2014 California Report: Through Appendix J, http://www.thermostat-recycle.org/files/uploads/2014_CA_TRC_Annual_Report_Appendix_J.pdf."

TRC, "2014 California Report: Appendix K-S, http://www.thermostat-recycle.org/files/uploads/2014_CA_TRC_Annual_Report_Appendix_K-S.pdf."

TRC, "2015 California State Annual Report, http://www.thermostat-recycle.org/files/uploads/2015_CA_State_Annual_Report_FINAL.pdf."

TRC, "2015 California Annual Report: Appendix 17-21, http://www.thermostat-recycle.org/files/uploads/2015_CA_State_Annual_Report_App17-21.pdf."

The Vermont Agency of Natural Resources (ANR), "Mercury Thermostats: Methods to Increase Recycling, Legislative Report." January 15, 2008.

Weeks, Jennifer (2006) "Take this product back and recycle it!" In Business 28, no. 6: 12. MasterFILE Premier, EBSCOhost.

US CENSUS TABLES

Source: U.S. Census Bureau, 2010-2014 American Community Survey. "Table DP04: Selected Housing Characteristics."

Source: U.S. Census Bureau, 2010-2014 American Community Survey. "Table DP03: Selected Economic Characteristics."

Sources: U.S. Census Bureau, 2006-2010 American Community Survey. "Table S2401: OCCUPATION BY SEX AND MEDIAN EARNINGS IN THE PAST 12 MONTHS (IN 2010 INFLATION-ADJUSTED DOLLARS) FOR THE CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER."; U.S. Census Bureau, 2006-2010 American Community Survey. "Table C24010: SEX BY OCCUPATION FOR THE CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER - Universe: White Alone, Not Hispanic or Latino civilian employed population 16 years and over."; U.S. Census Bureau, 2006-2010 American Community Survey. "Table C24010: SEX BY OCCUPATION FOR THE CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER - Universe: Black or African American civilian employed population 16 years and over."; U.S. Census Bureau, 2006-2010 American Community Survey. "Table C24010: SEX BY OCCUPATION FOR THE CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER - Universe: Asian Alone civilian employed population 16 years and over."; U.S. Census Bureau, 2006-2010 American Community Survey. "Table C24010: SEX BY OCCUPATION FOR THE CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER - Universe: Hispanic or Latino civilian employed population 16 years and over."

Source: U.S. Census Bureau, 2006-2010 American Community Survey. "Table S0101: Age and Sex."