Thermostat Recycling CORPORATION

500 Office Center Drive – Suite 400 | Fort Washington, PA 19034| thermostat-recycle.org

VIA EMAIL and US Mail

April 18, 2017

Ms. Hoa Dao
Pennsylvania Department of Environmental
Protection Bureau of Waste Management
Division of Hazardous Waste Management
P.O. Box 69170
Harrisburg, PA 17106-9170

Subject: Thermostat Recycling Corporation's 2016 Annual Report

Dear Ms. Dao:

In many ways, the start of 2017 marks a new beginning for the TRC. We remain true to our core mission of recycling mercury-containing thermostats throughout the contiguous 48 states, but now our methods for doing so are more aligned. In this annual report, you will learn that TRC enjoyed the following results in Pennsylvania:

- The program collected 9,676 thermostats in 2016 equaling 88.8 pounds of mercury.
- 59% of the partner locations returned at least one bin compared to a national average of 44%.
- The counties with the most bins returned in 2016 were Luzerne (20 bins), Philadelphia (19 bins), and Lehigh (16 bins each).

Lastly, TRC has reformatted its annual report. This year's report still contains the required data you rely on, but with a more streamlined presentation to help you find what you are looking for with greater ease.

If the department wishes to discuss this or other TRC business, please don't hesitate to contact me directly at 571-302-0877.

Sincerely yours,

Ryan L Kiscaden
Executive Director
P: 267.513.1727
E: ryan.kiscaden@thermostat-recycle.org
500 Office Center Drive, Suite 400 | Fort Washington, PA 19034

Thermostat Recycling CORPORATION

An industry-funded nonprofit recycling mercury thermostats since 1998

PENNSYLVANIA ANNUAL REPORT

FY 2016

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PENNSYLVANIA COLLECTIONS

In Pennsylvania (PA), TRC recovered the equivalent of 10,092 mercury thermostats from 9,676 whole mercury thermostats plus 595 loose mercury switches. A total of 88.8 pounds of mercury was diverted from solid waste.

The majority of thermostats collected in state were through HVAC Wholesale Distributors (92%) followed by HVAC contractors (6%), and household hazardous waste facilities (2%).

PENNSYLVANIA COLLECTIONS

EXHIBIT 1: 2016 PENNSYLVANIA COLLECTIONS BY BRAND

Brand Holder	Thermostats	Count Switches	Pounds Mercury
Bard Manufacturing Corporation	7	9	0.0558
Burnham Holdings, Inc	21	21	0.1302
Carrier Corporation	504	864	5.3568
Chromalox	0	0	0
Climate Master, Inc.	0	0	0
Crane Company	0	0	0
Emerson Electric Corporation/White Rodgers	748	907	5.6234
Empire Comfort Systems	2	3	0.0186
General Electric Corporation	67	186	1.1532
Goodman Global	80	141	0.8742
Honeywell Corporation	6760	8946	55.4652
Hunter Fan Company	1	1	0.0062
Invensys LLC	28	29	0.1798
ITT Corporation	11	11	0.0682
Lear Siegler (Original Charter Corporation)	6	8	0.0496
Lennox International Inc.	374	615	3.813
Lux Products Corporation	61	72	0.4464
McQuay International	2	2	0.0124
Nortek Global HVAC	57	87	0.5394
Rheem Manufacturing Company	63	110	0.682
Sears Holdings	51	55	0.341
Taco Comfort Solutions	0	0	0
The Marley-Wylain Company	1	3	0.0186
TPI Corporation	0	0	0
Trane Residential Systems	471	1050	6.51
Uponor, Inc	0	0	0
Vaillant Corporation	1	2	0.0124
W. W. Grainger, Inc.	3	3	0.0186
York/Johnson Controls	238	437	2.7094
–-Non-Member Brands–-			
ADDISON	1	4	0.0248
AMERICAN STABILIS	2	2	0.0124
CAM STAT	1	1	0.0062

PENNSYLVANIA COLLECTIONS

ces	2	6	0.0372
chevron	1	1	0.0062
CLIMATETROL	1	1	0.0062
Climatrol	1	1	0.0062
COLUMBIA	1	1	0.0062
COMFORT ZONE	1	1	0.0062
DATCO	2	2	0.0124
EFM	20	20	0.124
energy kinetics	2	2	0.0124
FEDDERS	1	1	0.0062
FLORIDA HEAT AND PUMP	4	12	0.0744
Florida Heat Pump	3	18	0.1116
Gemline	1	1	0.0062
HB SMITH	1	1	0.0062
ISI	1	1	0.0062
JADE	1	1	0.0062
Mini Vector	1	2	0.0124
Minivector	3	5	0.031
NRC	1	1	0.0062
NY	1	1	0.0062
OIL-O-MATIC	1	1	0.0062
REPCO	1	1	0.0062
ROBERTS GORDON	1	1	0.0062
SWEAT WARNER	1	1	0.0062
TETCO	2	4	0.0248
UGI	3	3	0.0186
WORTHINGTON	1	1	0.0062
–NOM (Manufacturer not identifiable)–			
NOM	56	61	0.3782
Loose Switches	0	595	3.689
TOTAL	**9,676**	**14,316**	**88.76**

PENNSYLVANIA COLLECTIONS

WASTE MERCURY-ADDED THERMOSTAT MANAGEMENT – HONEYWELL INTERNATIONAL (1/01/2016 – 12/19/2016)

As in previous years, in the first eleven and a half months of 2016, TRC's bins with waste mercury-switch thermostats were received at the fulfillment/processing center in Golden Valley, Minnesota. The facility is owned and operated by Honeywell International under contract with TRC.

Bins were received at the loading dock and sent to the TRC processing area. The bin and plastic liner were opened and the contents were identified, sorted, and tallied. The following data was recorded for each bin returned and processed: bin number, business name (location name), city, state, zip code, date returned, number of thermostats and mercury switches by manufacturer and any non-conforming material.

The bin was returned to the location that sent it in with a new prepaid address label within 72 hours of receipt. The thermostats were stored and staged in a plastic lined carton in a storage area for final processing. The containers were dated and processed in order received, first in-first out.

The containers were returned from the storage area to the TRC processing area to have the mercury bulbs removed from the plastic housing. Universal Waste Regulations require the disposal of waste within 12 months of generation. TRC's processor requires that the disposal occur within 6 months of generation and TRC follows the more stringent requirement. Small quantities of thermostats were removed from the container, which was then closed again, and placed at the bulb removal workstation on a tray that contains any potential mercury spillage. The bulbs were removed from the thermostats and placed into a 2-quart container at the work station. If a bulb broke and the mercury spilled, the work area was designed to contain the spillage and the operators were trained in the clean-up and disposal of mercury. The TRC processing area was equipped with special mercury vacuum cleaners and the work area was vacuumed at the end of the work day to assure that any spillage was cleaned up and not left to evaporate.

PENNSYLVANIA COLLECTIONS

The 2-quart container were emptied into a special 55-gallon drum which was labeled and dated according to regulations. The drum was sealed with a band and only opened when contents were being added to it. Special negative pressure venting assured any fumes were drawn away and vented when the drum was opened.

The 55-gallon drum was then shipped to Veolia Environmental Services in Port Washington, Wisconsin for final processing of the mercury ampoules (switches) Veolia Environmental Services met or exceeded all local, state, federal and EPA regulations for the management of the product. Veolia's approvals for mercury recovery/recycling included:

- EPA - identification WIR000130591 (Veolia Environmental Services, Inc.)
- EPA BDAT Requirement - satisfied by all recovery operations
- CERCLA (Comprehensive Environmental Response Compensation and Liability Act)
- Wisconsin Department of Natural Resources

All facilities processing thermostats shipped to TRC follow all EPA guidelines and regulations. TRC had a facility license from Hennepin County, Minnesota for the operation of the TRC. Honeywell, Inc. had a Hazardous Waste Generator license from Hennepin County. All persons who handled mercury thermostats as part of the TRC operation received training in the handling of Hazardous Waste and Universal Waste.

WASTE MERCURY-ADDED THERMOSTAT MANAGEMENT – VEOLIA (12/19/2016 – 12/31/2016)

In late November, TRC created a letter that was placed in outbound bins sent from its new processing center, Veolia, to participants in the program. The letter informed recipients that TRC would be relocating to Fort Washington, PA and that Veolia would be taking over the processing of collected thermostats for the next three years.

PENNSYLVANIA COLLECTIONS

Beginning December 19, 2016, bins with waste mercury-switch thermostats were received at a new fulfillment/inventory center in Port Washington, Wisconsin (WIR000130591). The facility is owned and operated by Veolia ES Technical Solutions, L.L.C. (Veolia) under contract with TRC.

Bins are received at the loading dock and sent to the TRC inventory area. The bin and plastic liner are opened and the contents are identified, sorted, and tallied. The following data is recorded for each bin returned and processed: bin number, business name (location name), city, state, zip code, date returned, number of thermostats and mercury switches by manufacturer and any non-conforming material.

The bin is returned to the location that sent it in with a new prepaid address label within 72 hours of receipt. The thermostats are stored and staged in a plastic lined carton in a storage area for final processing. The containers are dated and processed in order received, first in-first out.

The thermostats and any loose bulbs collected from the bins are consolidated into a special 55-gallon drum which is labeled and dated according to regulations. The drum is sealed with a band and is only opened when contents are being added to it. Special negative pressure venting assures any fumes are captured and vented when the drum is opened.

The 55-gallon drum is then shipped to Veolia's mercury recovery facility (WID988566543) for final processing of the mercury ampoules (switches). Veolia Environmental Services meets or exceeds all local, state, federal and EPA regulations for the management of the product.

The containers are returned from the storage area to the mercury recovery processing area to have the mercury bulbs removed from the plastic housing. Universal Waste Regulations require the recycling and disposal of waste within 12 months of acceptance at the processing facility.

Small quantities of thermostats are removed from the container, which is then closed again, avoiding spillage. The bulbs are removed from the thermostats and placed into processing vessel at the work station. Once the processing vessel is full, the vessel is loaded into the mercury recovery retort oven.

PENNSYLVANIA COLLECTIONS

If a bulb breaks and the mercury spills, the work area is designed to contain the spillage and the operators are trained in the clean-up and disposal of mercury. The TRC inventory and processing areas are equipped with special mercury vacuum cleaners and the work area is vacuumed at the end of the work day to assure that any spillage is cleaned up and not left to evaporate.

Veolia meets or exceeds all local, state, federal and EPA regulations for the management of the product. The mercury recovery facility and process are permitted by the Wisconsin Department of Natural Resources. Veolia's approvals for mercury recovery/recycling include:

- EPA - identification WID988566543
- Hazardous Waste Storage License #6008
- Hazardous Waste Treatment License (Mercury Recovery Operations) #4585
- Air Operation Permit #246076050-S01
- Storm Water General Permit #WI-S067857-4

In addition to the regulatory permits, both Veolia Port Washington facilities have developed and maintain management systems in accordance with ISO 14001-2004, OHSAS 18001-2007, and Responsible Recycling (R2:2013) Practice. All persons who handle mercury thermostats as part of the TRC operation receive training in the handling of Hazardous Waste and Universal Waste.

2016 PROGRAM EXPENSES

EXHIBIT 8: 2016 PROGRAM ADMINISTRATIVE EXPENSES

Program Component	2015	2016	% Change
Direct Expense for Marketing & Outreach	$ 277,434	$ 1,254,329	352%
Incentive/Promotional Payments	$ 42,224	$ 44,460	5%
Legal	$ 15,399	$ 30,952	101%
New Collection Containers	$ 10,960	$ 13,473	23%
Recycling Costs	$ 347,555	$ 308,899	-11%
Travel	$ 81,152	$ 79,259	-2%
TRC Staff and Administration	$ 625,137	$ 548,137	-12%
Total (expenses)	**$ 1,399,862**	**$ 2,279,509**	**63%**

Compared to prior years, variances in these program components were much more volatile. Causes for changes include:

- **Direct Expense for Marketing and Outreach:** Per the consent order in the state of CA, 25 of the 29 TRC members retained vendors for services related to compliance with the order. In addition to compliance, TRC focused on expanding advertising to non-traditional audiences realizing a 50% increase in its advertising budget.
- **Legal:** TRC employed a lawyer, on a fulltime basis, for consultant services whereas services were ordered on an ad-hoc basis in previous years.
- **Recycling Costs:** Because the program received less to process in 2016 compared to 2015, a reduction in the costs to manage the end of life mercury bearing thermostats mirrored collections. It is important to note that the costs related to processing thermostats will increase in 2017 as we transition to the new processing facility, Veolia.
- **TRC Staff and Administration:** TRC released two employees at the conclusion of 2016 and operated with one less full-time employee throughout much of 2016 due to termination. In addition to personnel, TRC moved its offices with a reduction of lease occupancy expenses to be expected of 50% or greater.

2016 PROGRAM EXPENSES

EXHIBIT 9: 2016 PROGRAM EXPENSES WITH PENNSYLVANIA SPECIFIC COSTS

Category	PA	National	Total Expenses
Direct Expense for Marketing & Outreach	$ 4,295	$154,465	$ 1,254,329
Incentive/Promotional Payments	$ 249	$ 7,940	$ 44,460
Legal	$ -	$ 30,772	$ 30,952
New Collection Containers	$ -	$ 13,473	$ 13,473
Recycling Costs	$ 15,634	$190,953	$ 308,899
Travel	$ 2,273	$ 36,046	$ 79,259
TRC Staff and Administration	$ 10,149	$410,463	$ 548,137
Total (expenses)	**$ 32,600**	**$844,112**	**$ 2,279,509**

Clarification on classes for costs: TRC uses an accounting process in QuickBooks which allows the organization to code expenses to both account code and class. Classes set up for allocation include individual states, a "mandatory" classification, and a "national" classification.

These classifications allow TRC to correctly attribute costs in an appropriate manner. For example, many times marketing activities are best done at the "mandatory" classification for economies of scale. If TRC engages a marketing activity geared towards multiple states (i.e. a direct mail piece) then TRC will allocate the costs of the marketing piece across all 13 states which require mandatory manufacturer funding to operate the program.

After all costs (both state specific and "mandatory") are allocated to a state, the remaining category is "national". Because TRC operates in 48 states, these costs are not split evenly among the 13 "mandatory" states.

Instead, costs in this category are correctly attributed to the "national" categorization. As you can see demonstrated above, more than a 1/3 of TRC costs are allocated to non-specific state costs.

TRC Staff and Administration: Any costs for a specific state will take the hours worked at the TRC employee level multiplied by each individual's hourly rate.

2016 PROGRAM EVALUATION

The Thermostat Recycling Corporation (TRC) is a non-profit stewardship organization that facilitates and manages the collection and proper disposal of mercury-containing thermostats. TRC is supported by 29 manufacturers and provides a network of collection sites around the United States with the aim of keeping mercury out of the waste stream and protecting the environment. The following analytical report details the annual program performance for mercury thermostat collection in the state of Pennsylvania (PA) in 2016. A few of the program highlights for 2016 are included below:

- In 2016, the program **collected 88.8 lb of mercury** in Pennsylvania**.** Since 1999, the mercury collected in Pennsylvania has decreased by an annual average of 56% per year. During the same period, total mercury collected nationally increased by 19% per year.
- The program collected **9,676 whole thermostats in 2016**, a 33% decrease from 2015 and a 57% increase from a decade ago. The number of thermostats collected annually in Pennsylvania has increased by a year-over-year average of 48% since 1999.
- **The number of whole thermostats collected per bin in 2016 was 46 thermostats.** This was less than the 18-year state average of 83 thermostats per bin.
- The Pennsylvania counties that returned the most thermostats in 2016 were **Lehigh (16 bins, 1,197 thermostats), Montgomery (15 bins, 927 thermostats), and Bucks (13 bins, 796 thermostats).** Luzerne and Philadelphia counties returned 20 and 19 bins, the most bins in the state, but only 318 and 293 thermostats respective.
- In 2016, **59% of partner locations returned at least one bin** compared to a national average of 44%.
- In 2016, **32 site visits were conducted and 44 'miss you' calls were placed in Pennsylvania.** No statistically significant relationship was found between the number of calls placed or visits made and the number of bins returned.
- In addition to 9,676 whole thermostats, 595 loose switches were collected, bringing the total number of "thermostat equivalents" returned in 2016 to 10,092, a decrease of 33% from 2015.

2016 PROGRAM EVALUATION

SECTION 1: Program Analytics

Section 1 of this report examines the annual performance of the thermostat collection recycling program in terms of bins, thermostats, and mercury collected as well as the year-over-year progression of the program.

On average, the program has **collected 70.1 lb of mercury and 7,264 whole thermostats per year** since 1999. In 2016 the program **collected 88.8 lb of mercury from 9,676 whole thermostats and 595 loose switches**. Figure 1.1 displays the total number of bins, thermostats, and quantity of mercury collected in the state since the beginning of the program.

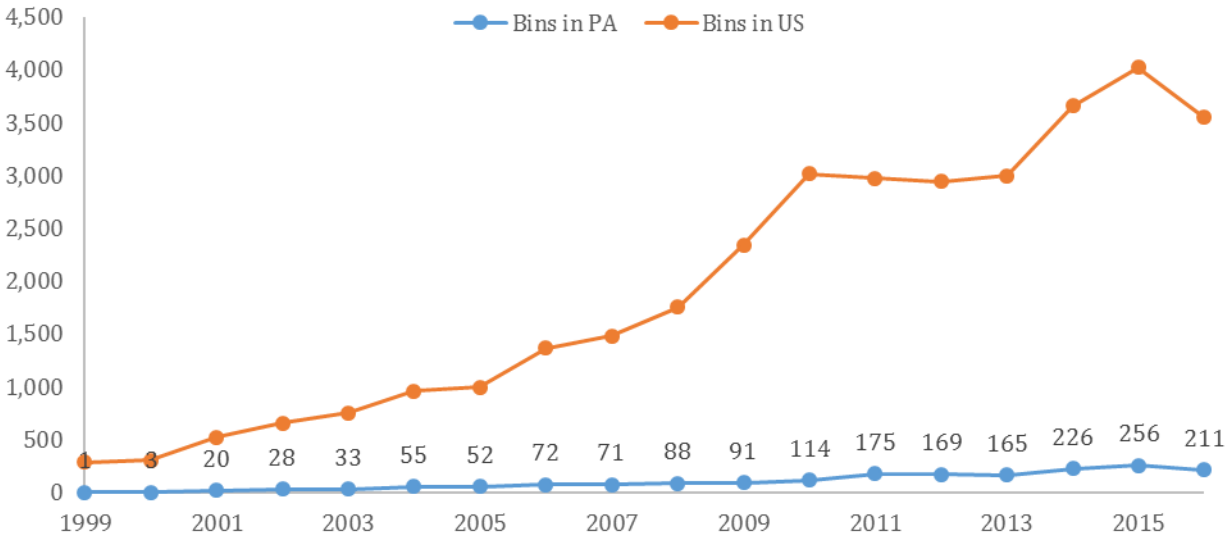
FIGURE 1.1: PROGRAM PERFORMANCE OVER TIME

Year	Number Bins	Number Stats	Lb Mercury
1999	1	150	1.0
2000	3	278	2.5
2001	20	1,632	16.8
2002	28	2,242	25.8
2003	33	2,548	25.8
2004	55	4,632	46.2
2005	52	4,968	46.0
2006	72	7,019	59.4
2007	71	6,175	64.2
2008	88	7,560	72.2
2009	91	7,320	82.7
2010	114	9,500	99.1
2011	175	14,411	133.2
2012	169	11,406	114.8
2013	165	12,696	119.5
2014	226	14,201	133.0
2015	256	14,338	130.1
2016	211	9,676	88.8
Average	*102*	*7,264*	*70.1*
Total	*1,830*	*130,752*	*1,260.9*

2016 PROGRAM EVALUATION

Figure 1.2 displays the number of bins collected in the state over time as well as the total number of bins collected nationally over the same period. The number of bins collected in Pennsylvania has risen gradually since the start of the program in 1999, though the number of bins collected in 2016 decreased by nearly 18% relative to 2015.

FIGURE 1.2: BINS COLLECTED OVER TIME IN THE STATE AND NATIONALLY



Since 1999, **the average of year-over-year increases in mercury collected is 56%** in Pennsylvania. During the same period, the quantity of mercury collected nationally increased by 19% per year. **In 2016, the quantity of mercury collected decreased by 32% from 2015**.

2016 PROGRAM EVALUATION

Figure 1.3 displays the quantity of mercury collected in the state over time as well as the year-over-year percent increase (or decrease) in the state and nationally.

FIGURE 1.3: QUANTITY OF MERCURY COLLECTED IN PROGRAM AND YEAR-OVER-YEAR CHANGES IN THE STATE AND U.S.

Year	Total Lb Hg	% Change State	% Change U.S.
1999	1.0	N/A	104%
2000	2.5	156%	11%
2001	16.8	570%	89%
2002	25.8	54%	14%
2003	25.8	0%	11%
2004	46.2	79%	17%
2005	46.0	0%	11%
2006	59.4	29%	32%
2007	64.2	8%	2%
2008	72.2	12%	16%
2009	82.7	14%	16%
2010	99.1	20%	26%
2011	133.2	34%	4%
2012	114.8	-14%	-5%
2013	119.5	4%	-5%
2014	133.0	11%	13%
2015	130.1	-2%	-1%
2016	88.8	-32%	-15%
Average	*70.1*	*56%*	*19%*

2016 PROGRAM EVALUATION

The state of Pennsylvania collected 9,676 thermostats in 2016. This was a **32% decrease from 2015 but a 57% increase from a decade ago**. The average of year-over year increases in thermostats collected in Pennsylvania is **48% since 1999**. Yearly increases in the U.S. averaged 12% over the same period. Figure 1.4 displays the total number of thermostats collected in the state and nationally, and Figure 1.5 displays the underlying data as well as the year-over-year percent change.

FIGURE 1.4: NUMBER OF WHOLE THERMOSTATS COLLECTED OVER TIME IN THE STATE AND NATIONALLY

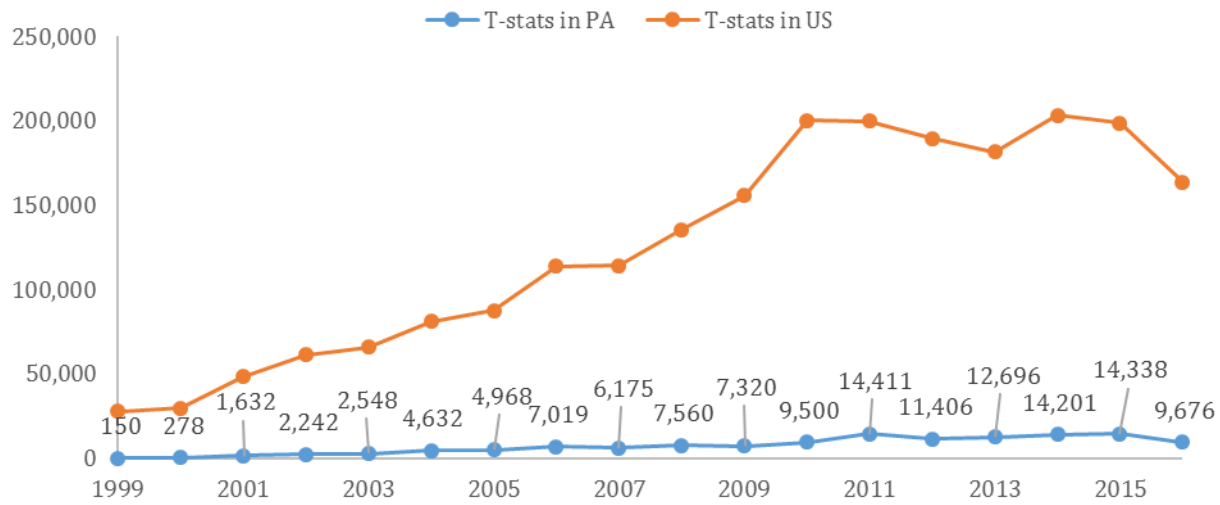


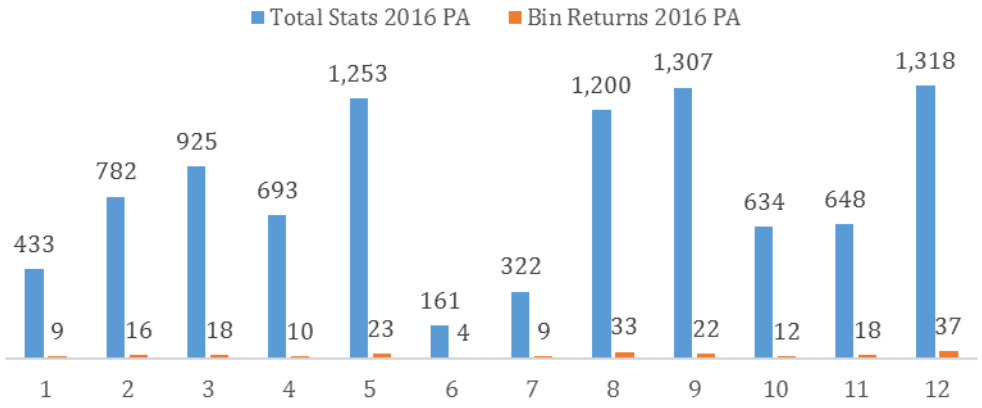
FIGURE 1.5: WHOLE THERMOSTATS COLLECTED IN THE STATE AND U.S. OVER TIME

Year	T-stats in PA	T-stats in U.S.	% Change State	% Change U.S.
1999	150	27,965	-	-
2000	278	29,637	85%	6%
2001	1,632	48,350	487%	63%
2002	2,242	61,422	37%	27%
2003	2,548	65,778	14%	7%
2004	4,632	81,115	82%	23%
2005	4,968	87,754	7%	8%
2006	7,019	113,658	41%	30%
2007	6,175	114,158	-12%	0%
2008	7,560	135,646	22%	19%
2009	7,320	155,731	-3%	15%
2010	9,500	200,064	30%	28%
2011	14,411	199,918	52%	0%
2012	11,406	189,619	-21%	-5%
2013	12,696	181,600	11%	-4%
2014	14,201	203,346	12%	12%
2015	14,338	198,603	1%	-2%
2016	9,676	163,606	-33%	-18%
Average	*7,264*	*125,443*	*48%*	*12%*

2016 PROGRAM EVALUATION

Figure 1.6 displays the monthly distribution of bins and thermostats collected in the state in 2016. Most bins were returned in **August (33 bins), September (22 bins), and December (37 bins).** The most thermostats were returned in **May (1,253 thermostats), September (1,307 thermostats), and December (1,318 thermostats).**

FIGURE 1.6: WHOLE THERMOSTATS AND BINS COLLECTED PER MONTH 2016



2016 PROGRAM EVALUATION

The highest number of thermostats per bin occurred in **April (69 thermostats per bin) and September (59 thermostats per bin).** Figure 1.7 shows the average number of thermostats per bin per month for the year.

FIGURE 1.7: AVERAGE THERMOSTATS PER BIN RETURNED PER MONTH

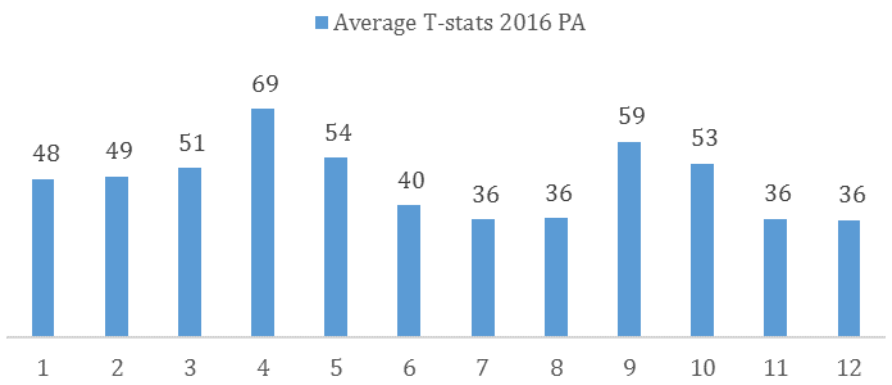


Figure 1.8 displays the average number of thermostats returned per bin in the state and nationally since the beginning of the state program. Nationally, the number of thermostats per bin has been decreasing annually since 2000, and a similar pattern is observed in Pennsylvania except in years 2003 to 2005.

Figure 1.8: Average Number of Thermostats per Bin over Time in the State and Nationally

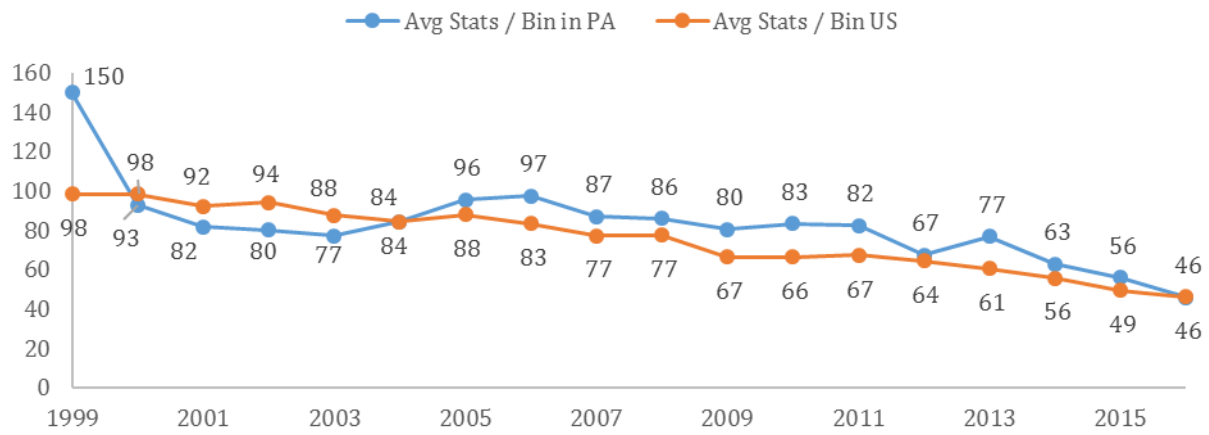
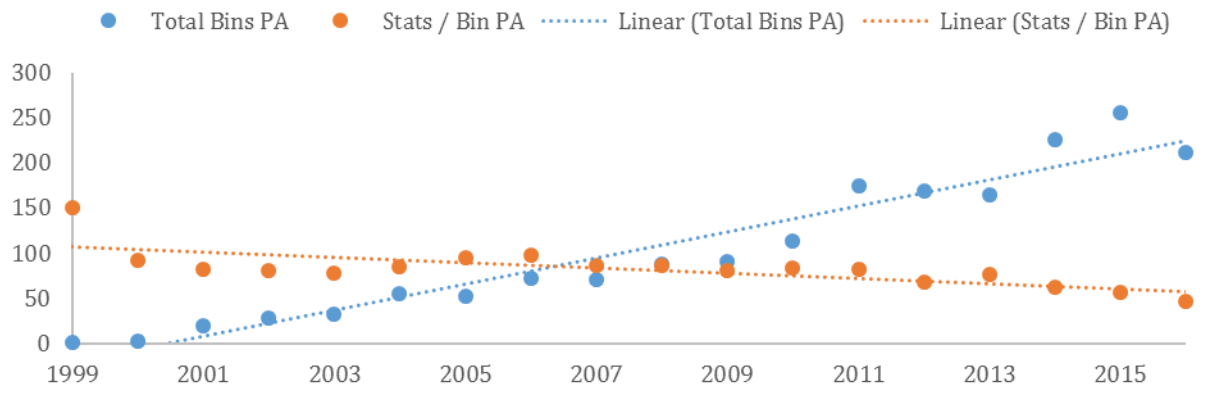


Figure 1.9 plots the total bins returned over time along with the average number of thermostats per bin over the same period to determine a relationship between the two. Excluding the first year where only one bin was returned with 150 thermostats, a negative correlation between total bins returned and number of thermostats per bin is supported by a statistical analysis. From 2000 to 2016, as the number of bin returns increased, the number of thermostats per bins decreased on average.

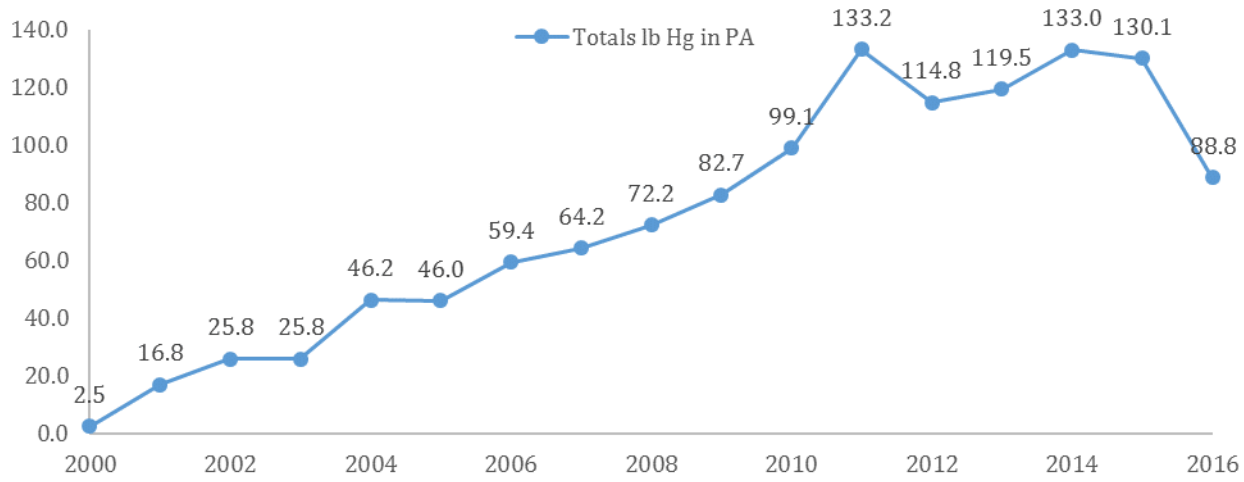
FIGURE 1.9: BINS AND AVERAGE NUMBER OF THERMOSTATS PER BIN OVER TIME



2016 PROGRAM EVALUATION

Figure 1.10 shows the total quantity (lb) of mercury collected annually in Pennsylvania. The quantity of mercury collected increased gradually from 1999 to 2015, with a spike in collection occurring in 2011.

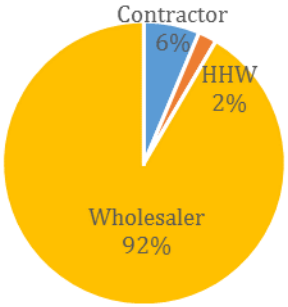
FIGURE 1.10: TOTAL QUANTITY OF MERCURY COLLECTED ANNUALLY



SECTION 2: Channel Partner Analysis

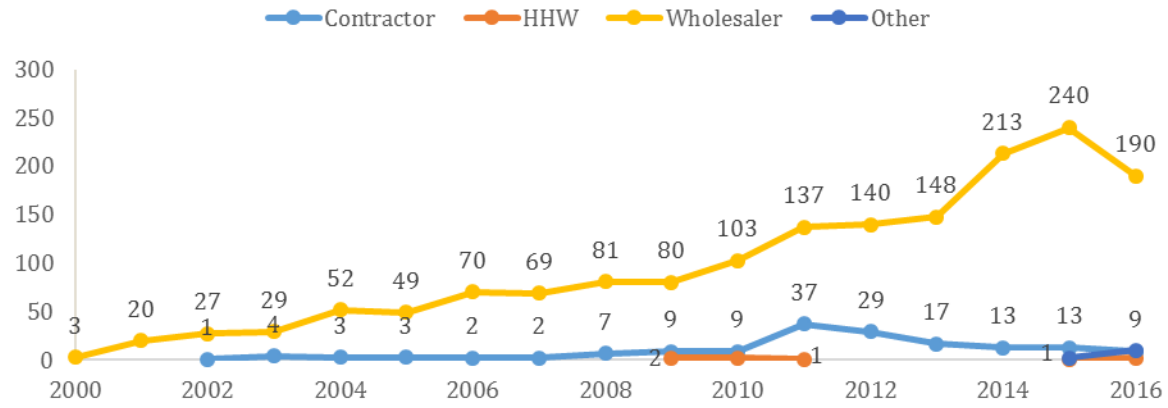
Section 2 of this report examines the partner locations in more detail. Most thermostats collected in the state were through **wholesalers (92%)** with the remaining collected by **contractors (6%)** and **household hazardous waste facilities (2%)**. Figure 2.1 shows the distribution of thermostats collected by location type in 2016.

FIGURE 2.1: THERMOSTATS COLLECTED BY LOCATION TYPE IN 2016



The number of bins returned by wholesalers decreased from 240 to 190 bins in 2016. The number of bins returned by contractors and hazardous household waste facilities was comparable to 2015 levels. Figure 2.2 displays the change in the number of bins returned by thermostat collection type over time in the state.

FIGURE 2.2: THERMOSTAT BINS RETURNED BY LOCATION TYPE OVER TIME



In 2016, **59% of the locations** with a bin in Pennsylvania sent back at least one bin for recycling. The distribution is displayed in Figure 2.3.

FIGURE 2.3: PERCENTAGE OF STORES RETURNING A BIN IN 2016

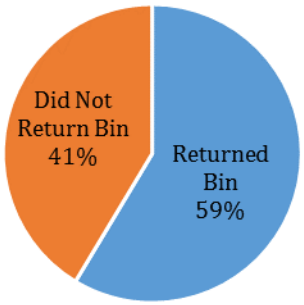
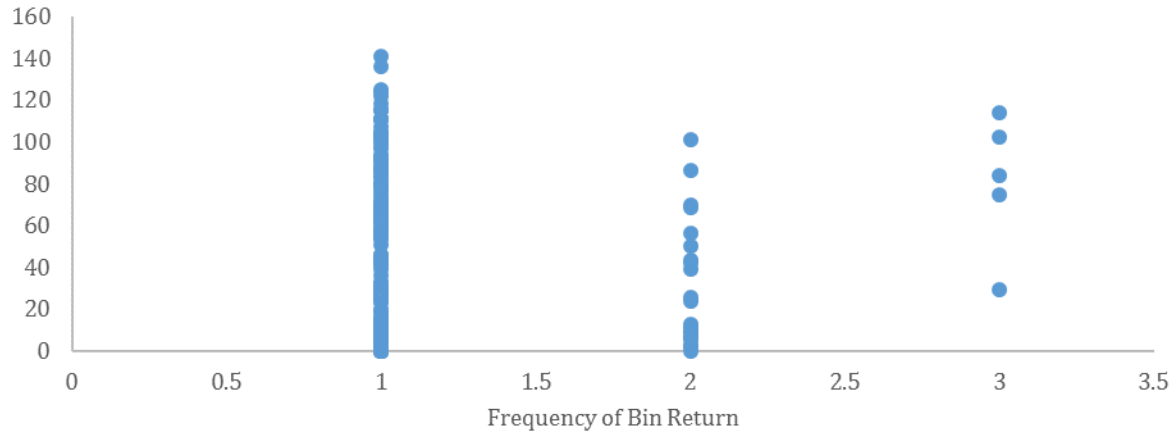


Figure 2.4 compares the frequency of bins returned per location and the number of thermostats per bin. The analysis sought to determine a correlation between the two variables. There is a wide range in the number of thermostats per bin for bins returned once, twice, and three times per year. A bin returned three times in 2016 may have more thermostats on average per return than a bin

returned only once. This large variation indicates there is no relationship between the number of times a bin was returned and the number of thermostats per bin.

FIGURE 2.4: CORRELATION OF FREQUENCY OF BIN RETURN AND NUMBER OF THERMOSTATS PER BIN



2016 PROGRAM EVALUATION

An analysis of the top performing counties revealed **Luzerne (20 bins), Philadelphia (19 bins), and Lehigh (16 bins)** returned the most bins in 2016. The counties that returned the most thermostats in 2016 were **Lehigh (1,197 thermostats), Montgomery (927 thermostats), and Bucks (796 thermostats).** Figure 2.5 displays the total bins and thermostats returned by county in 2016.

FIGURE 2.5: BINS AND TOTAL THERMOSTATS RETURNED IN 2016 BY COUNTY

County Name	Total T-stats	Total Bins	County Name	Total T-stats	Total Bins
Lehigh	1,197	16	Fayette	109	2
Montgomery	927	15	Crawford	104	1
Bucks	796	13	Columbia	92	1
Allegheny	661	13	Blair	87	2
Chester	651	13	Northampton	84	2
Lancaster	595	7	Lackawanna	82	6
Delaware	484	8	Washington	73	2
Cumberland	384	8	Indiana	68	2
Westmoreland	384	9	Somerset	61	1
Butler	381	6	Mifflin	54	1
Berks	372	6	Cambria	44	1
Luzerne	318	20	Adams	35	2
Philadelphia	293	19	Monroe	32	5
Mercer	252	3	Wyoming	26	2
Lebanon	250	3	Wayne	16	1
Beaver	198	2	Bedford	14	1
York	197	6	Erie	13	3
Dauphin	187	3	Bradford	6	1
Lycoming	144	4	Centre	5	1

TRC partner locations **R.E. Michel Company (2,980 thermostats), Johnstone Supply (934 thermostats), and APR Supply Company (847 thermostats)** were the top three performing partners in Pennsylvania. In addition, 16 partner locations returned more than 100 thermostats, 23 returned more than 10 thermostats, and 8 returned more than 1 thermostat in 2016.

Figure 2.6 displays the top performing partners in terms of total thermostats returned in 2016.

FIGURE 2.6: TOP PERFORMING TRC PARTNERS IN THE STATE

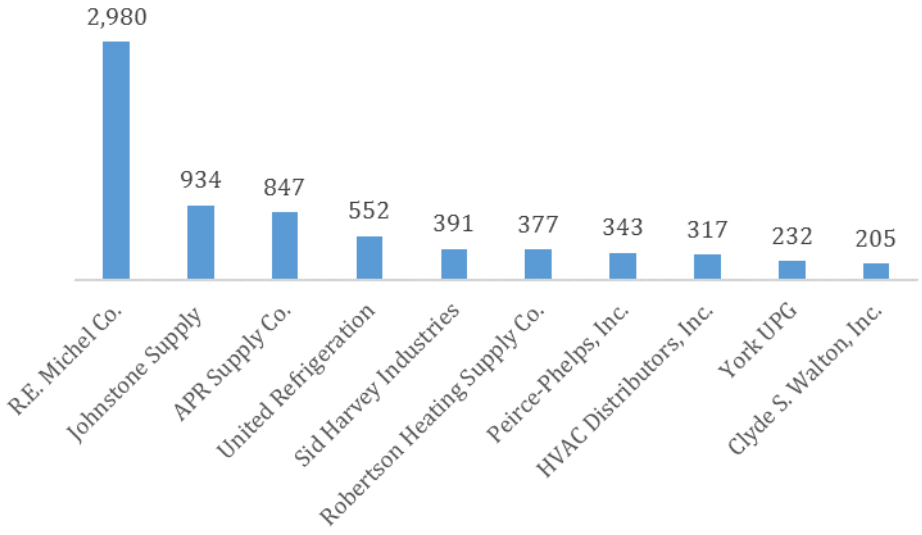


Figure 2.7 looks at the top performers in more detail. The figure includes the top performers for the year by each of the following categories: total bins returned, total thermostats returned, and average number of thermostats per bin.

FIGURE 2.7: TOP PERFORMING PARTNERS BY TOTAL BINS AND THERMOSTATS

Company Name	No. of Thermostats	No. of Bins	Thermostats / Bin
R.E. Michel Company	2,980	37	81
Johnstone Supply	934	14	67
APR Supply Company	847	23	37
United Refrigeration	552	17	32
Sid Harvey Inc.	391	9	43
Robertson Heating Supply Company	377	4	94
Peirce-Phelps, Inc.	343	7	49
HVAC Distributors, Inc.	317	5	63
York UPG	232	8	29
Clyde S. Walton, Inc.	205	2	103

To increase the number of thermostats returned, TRC conducted site visits to collection locations that may not have participated in the program recently. In 2016, **32 site visits were conducted and 44 'miss you' calls were placed** in Pennsylvania. Figure 2.8 displays the relationship between the number of site visits per month, bins returned per month, and the number of thermostats (in 100's) returned per month. The number of bins returned oscillated through the year, increasing and decreasing irrespective of when site visits were conducted. No statistically significant relationship between site visits and the number of bins returned was found.

FIGURE 2.8: RELATIONSHIP BETWEEN SITE VISITS AND BINS AND THERMOSTATS RETURNED PER MONTH

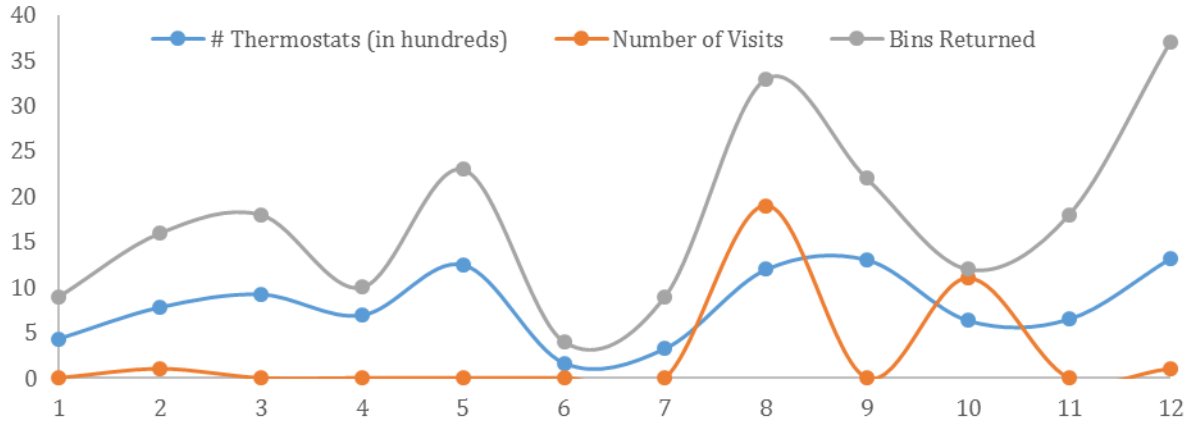
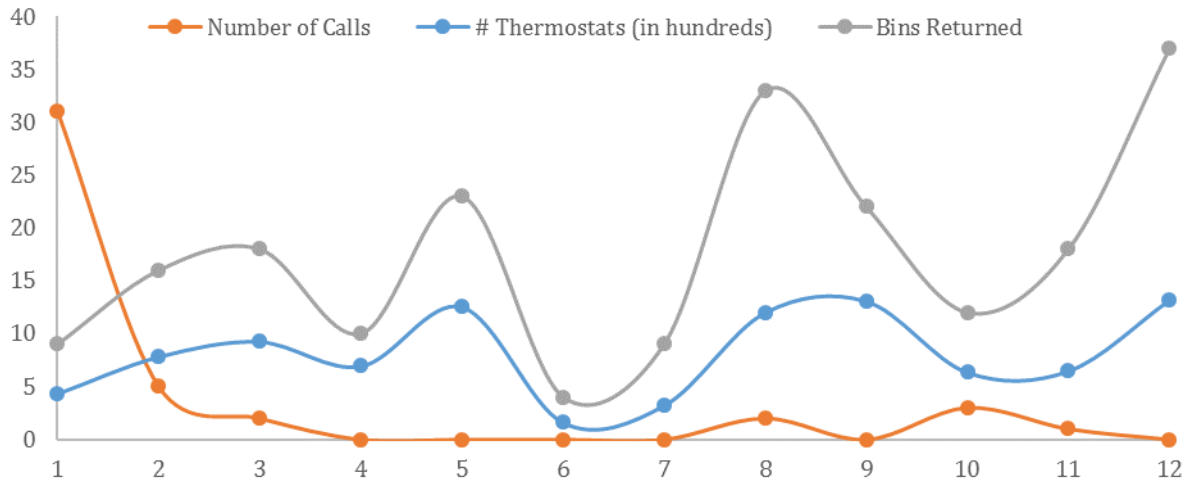


Figure 2.9 displays the relationship between number of calls per month, bins returned per month, and number of thermostats (by 100's) returned per month. Most calls were placed in January of 2016, but the peak in bins returned occurred in December. There is no statistically significant relationship between calls and the number of bins returned.

FIGURE 2.9: RELATIONSHIP BETWEEN 'MISS YOU' CALLS AND BINS AND THERMOSTATS RETURNED PER MONTH



SECTION 3: COMPARISIONS TO NATIONAL AND OTHER STATES' DATA

To compare how state collection partners performed in 2016, the national average for the number of bins returned per total locations since 2012 was calculated and compared to the state average over the same period. The average number of bins include locations that did not return any bins in a given year. It should be noted when making comparisons that each state has different regulations, housing type mixes, local policies and incentives that may have a unique impact on returns. Overall, the average number of bins returned per location per year was approximately equal, but slightly lower in Pennsylvania than the U.S. average. However, since 2012, the average number of bins returned per year in Pennsylvania has increased faster than the national average and in 2016 was nearly on par with the national average, shown in Figure 3.1.

FIGURE 3.1: AVERAGE NUMBER OF BINS RETURNED PER LOCATION PER YEAR

Average number of bins returned per year per location	2012	2013	2014	2015	2016
U.S. Average	1.4	1.4	1.6	1.8	1.5
PA Average	0.3	0.3	0.5	1.3	1.4

Figure 3.2 displays the locations in Pennsylvania that returned three or more bins in a given year since 2013, and Figure 3.3 displays the top 10 partners in the U.S. over the same period in terms of number of bins returned. Johnstone Supply, R.E. Michel Company, and United Refrigeration both appear as top five partners in Pennsylvania and nationally.

FIGURE 3.2: PARTNER LOCATIONS IN PENNSYLVANIA RETURNING THREE OR MORE BINS PER YEAR 2013-2016

Location	2013
R.E. Michel Company	49
Johnstone Supply	21
United Refrigeration	16
Ferguson Enterprises	11
Peirce-Phelps, Inc.	10
APR Supply Company	4
Sid Harvey Industries	4
Meier Supply Company, Inc.	4
HVAC Distributors Inc.	4
UGI HVAC	4
Hannabery HVAC	4
Riley Sales	3
Trane Supply	3
Goodman Distribution Inc.	3
Location	**2014**
R.E. Michel Company	63
APR Supply Company	25
United Refrigeration	17
Johnstone Supply	15
Peirce-Phelps, Inc	15
Meier Supply Co. Inc.	8
Sid Harvey Industries	7
Lennox Industries Inc	6
HVAC Distributors Inc.	5
Goodman Distribution Inc.	5
Ferguson Enterprises	4
Trane Supply	4
Thos. Somerville Company	4
Riley Sales	3
R.F. Fager Company	3
Hannabery HVAC	3
Conestoga Supply	3
Keystone Supply	3

Location	2015
R.E. Michel Company, Inc.	39
Johnstone Supply Co.	33
United Refrigeration	22
APR Supply Company	21
Johnson Controls (York UPG)	11
Sid Harvey Industries	11
Meier Supply Co. Inc.	9
HVAC Distributors, Inc.	7
Lyon Conklin Co. Inc.	7
Peirce-Phelps, Inc.	7
Riley Sales	7
Robertson Heating Supply Company	7
Trane Parts Center	6
EPSCO	5
Lennox Industries Inc.	4
Scott Electric	4
Goodman Distribution, Inc.	3
Grove Supply Inc.	3
UGI HVAC	3
US Supply	3
Location	**2016**
R.E. Michel Company	37
APR Supply Company	23
United Refrigeration	17
Johnstone Supply	14
Sid Harvey Industries	9
York UPG	8
Peirce-Phelps, Inc.	7
HVAC Distributors Inc.	5
Meier Supply Co. Inc.	5
Binghamton Hardware & HVAC	5
Robertson Heating Supply Co.	4
EPSCO	4
Riley Sales	3
Us Supply	3
Goodman Distribution, Inc.	3
Famous Supply	3
Friedman Electric Supply Company	3

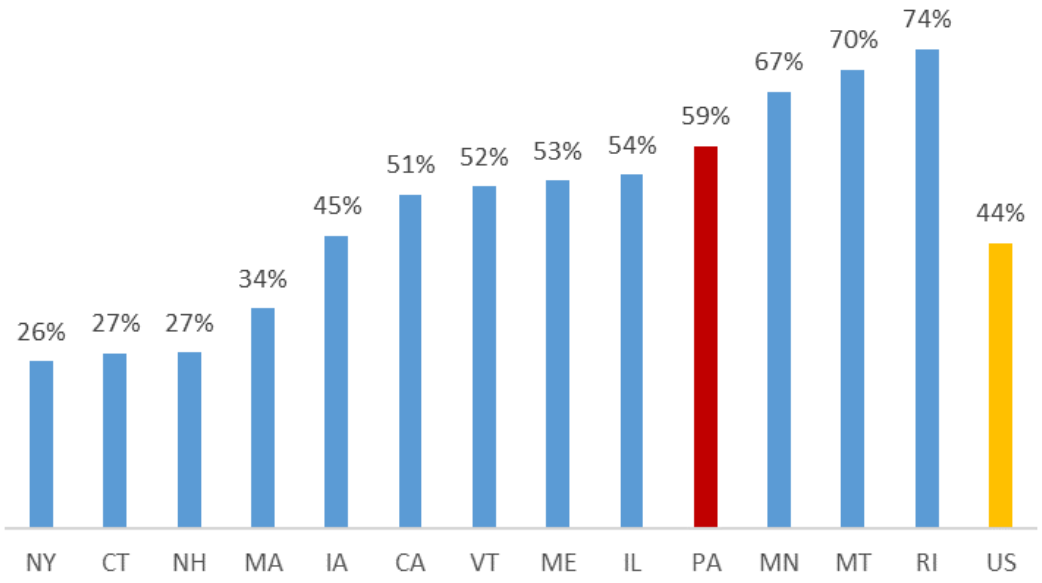
FIGURE 3.3: TOP PERFORMING PARTNER LOCATIONS NATIONWIDE IN BINS RETURNED 2013-2016

Location	2013	Location	2015
R.E. Michel Company	311	Johnstone Supply	519
Johnstone Supply	298	R.E. Michel Company	336
United Refrigeration	162	Ferguson Enterprises	184
Honeywell Inc.	118	United Refrigeration	176
Ferguson Enterprises	106	US Air Conditioning Distributors, Inc.	106
US Air Conditioning Distributors, Inc.	102	Goodman Distribution Inc.	70
Refrigeration Supplies Distributor	69	Gustave A Larson Company	62
Goodman Distribution Inc.	64	Refrigeration Supplies Distributor	54
Baker Distributing Company	47	Lennox Industries Inc	51
Comverge	41	Baker Distributing Company	50
Location	**2014**	**Location**	**2016**
R.E. Michel Company	461	Johnstone Supply	444
Johnstone Supply	460	R.E. Michel Company	292
US Air Conditioning Distributors, Inc.	127	United Refrigeration	237
Ferguson Enterprises	119	Lennox Industries Inc.	131
United Refrigeration	114	Ferguson Enterprises, Inc.	104
Goodman Distribution Inc.	95	Us Air Conditioning Distributors, Inc.	70
Honeywell Inc.	77	Ace Supply Co. Inc.	66
Gustave A Larson Company	67	Goodman Distribution, Inc.	66
Refrigeration Supplies Distributor	60	Lux Products	54
Lennox Industries Inc	60	F.W. Webb Company	47
C.C. Dickson Company	55	Baker Distributing Company	46
		Refrigeration Supplies Distributor	46

2016 PROGRAM EVALUATION

Figure 3.4 displays the total percentage of locations per state and for the entire U.S. with a bin that participated in the program in 2016 (participation is defined as sending back at least one bin). **In 2016, 59% of the locations in Pennsylvania returned a bin** compared to a national average of 44%. The state with the highest percentage of locations returning a bin in 2016 was Rhode Island (74%).

FIGURE 3.4: PERCENTAGE OF LOCATIONS RETURNING A BIN IN 2016



2016 PROGRAM EVALUATION

Figure 3.5 compares the state and national rates for several analytics in 2016. These include: the total whole thermostats, bins, and loose switches collected, the number of thermostats collected by total locations and per participating location, the number of thermostats per bin returned on average in 2016, the equivalent average, the number of mercury thermostat equivalents returned in 2016 and finally the percent change in mercury thermostat conversion from 2015 to 2016. The equivalent average is an average of the number of switches in whole thermostats collected in the state, and it is used to calculate the number of thermostats represented by returned loose switches. The thermostat equivalent number includes the totals of whole thermostats returned plus the number of thermostats estimated from loose switches.

FIGURE 3.5: COMPARISONS OF STATES AND U.S. AVERAGES AMONG SEVERAL CATEGORIES

State	Whole T-stats	Bins	Loose Switches	T-stats /total locations (avg.)	T-stats /bin (avg.)	T-stats /location returning a bin (avg.)	Eq. Avg.	T-stat Eq. 2016*	% Change
CA	15,501	472	1,273	26	33	51	1.8	16,189	-16%
CT	2,284	53	504	14	43	52	1.3	2,659	-31%
IA	2,098	49	212	27	43	60	1.3	2,259	-21%
IL	9,896	243	1,086	28	41	52	1.3	10,722	-7%
MA	5,232	95	408	22	55	65	1.3	5,555	-33%
ME	4,823	125	56	29	39	55	1.1	4,873	4%
MN	9,413	117	324	94	80	140	1.3	9,665	-5%
MT	468	24	14	17	20	25	1.1	481	109%
NH	2,141	43	457	15	50	56	1.2	2,517	-7%
NY	5,857	165	1,882	15	35	59	1.3	7,270	-31%
PA	9,676	211	595	37	46	63	1.4	10,092	-33%
RI	2,275	41	1,632	67	55	91	1.1	3,829	65%
VT	2,246	74	62	18	30	35	1.1	2,302	14%
U.S. Avg.	5,532	132	654	32	44	62	1.3	6,032	-16%

**T-stat Eq. = Thermostat Equivalents*