Efficient Neighborhoods+ Incremental Cost Assessment

To: Massachusetts PAs
From: Opinion Dynamics Evaluation Team
Date: July 8, 2015
Re: Incremental Cost Assessment of the First Round of the Efficient Neighborhoods+ Initiative

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This memorandum presents the results of the incremental cost analysis of the Efficient Neighborhoods+® (EN+) initiative. The results presented in this memo cover communities targeted during the first round of the EN+ initiative. Opinion Dynamics gathered incremental cost data through a series of data requests and follow-up discussions with Program Administrators (PAs) and implementation contractors. The sections below summarize data collection, cleaning, analysis, and estimation methods and present the results of the analysis, as well as provide caveats associated with the available data and analysis.

Note of Caution: Incremental costs for EN+ have been difficult to obtain and parse out from the costs associated with regular HES program activity. Cost data that we obtained were frequently rough estimates accompanied by considerable caveats as to their accuracy. This was particularly true for the incremental administrative costs. Neither PAs nor implementation contractors tracked administrative costs, and, due to the amount of time elapsed since the first round of the initiative, those costs were difficult to estimate accurately. The process was further complicated by internal PA staff changes and one PA hiring a new firm to implement the initiative. As a result, the evaluation team had to impute some costs. Consequently, the reader should treat the results presented below with caution.

Methodology

Definition and Data Collection Approach

For the purposes of this assessment, incremental costs include the following four cost sources:

- Incremental incentives paid for measures installed as part of the initiative
- Incremental marketing costs incurred by PAs and implementation contractors
- Incremental administrative (labor) costs incurred by PAs
- Incremental administrative (labor) costs incurred by implementation contractors

We defined administrative costs as staff time spent planning the initiative, coordinating between internal and external parties (across PAs, PAs with implementation contractors, etc.), answering customer or stakeholder questions and resolving issues, preparing and providing status reports, developing and making presentations, and conducting periodic status update meetings. We should note that these cost data are based on rough PA and implementation contractor estimates due to the amount of time elapsed since the initiative implementation.

Opinion Dynamics only included core communities in the analysis (Adams, Hyde Park, Lowell, North Adams, Plymouth, Townsend, Watertown, and West Springfield) and did not include the Liberty (Fall River) or the Cape Light Compact's initiatives, both of which had somewhat different program designs from that of EN+.

Opinion Dynamics collected incremental marketing cost data as part of the EN+ evaluation in 2014. We leveraged the collected data for this analysis but confirmed them with PAs. As a first step in obtaining the remaining incremental cost data, we prepared and submitted a detailed data request to PAs and implementation contractors. As a second step, we confirmed our understanding of the data through follow-up emails and telephone interviews. During the follow-up discussions, we explored any gaps, discrepancies, and possible omissions associated with the provided cost data. We were unable to gather incremental cost data for EN+ initiative efforts being implemented in the town of Townsend.

Data Analysis Approach

The incremental cost data analysis included the following steps:

- Analysis of program tracking data to isolate incremental incentives associated with the EN+ initiative
- Conversion of incremental staff hours into costs
- Allocation of incremental costs by PA and community
- Imputation of missing cost data
- Normalization of incremental costs by participation and energy savings

Incremental Incentive Calculation

Opinion Dynamics leveraged the HES program tracking data obtained from the PAs as part of the 2014 impact evaluation. For the purposes of the incremental cost analysis, we isolated EN+ program participants, namely customers residing in EN+ targeted census block groups who completed energy assessments and follow-up installation work during the EN+ implementation timeline.

The data contained detailed information on each participant including the energy efficient improvements completed through the program, as well as costs associated with each improvement. The incentive information, however, was provided as a combined total incentive amount per participating site. The evaluation team confirmed with the implementation contractor that it did not track more detailed incentive amounts. As such, we conducted an analysis to isolate the incentives paid for each individual measure. As part of the analysis, we assigned incentives to each measure using our knowledge of the program incentive structures (both EN+ enhanced and standard HES program incentives) and calculated incentives that customers would have received under the standard HES program as well as those they did receive under EN+. The difference between the two incentives represent the incentives that are incremental to EN+. It is important to note that, due to how the incentive information was tracked, this analysis was time consuming and required a considerable amount of manual review. In some cases, the analysis involved making assumptions about incentive allocation by measure.

Incremental Labor Costs Estimation

PAs and implementation contractors provided an estimate of the incremental hours that their staff spent administering the EN+ initiative. Implementation contractors also provided labor rates associated with the staff involved in the implementation of the EN+ initiative, therefore we easily converted the incremental hours into costs by multiplying them by labor rates.

To convert the PA staff time into costs, the evaluation team estimated loaded wage rates for relevant employee levels using the United States Bureau of Labor Statistics (BLS) data for the utility sector. We matched labor categories from the BLS to the labor categories that PAs provided to us and applied unloaded labor rates for those labor categories for the state of Massachusetts. We loaded wage rates for the applicable labor categories based on the BLS's national estimates of employer compensation costs. The BLS produces these estimates of compensation costs each quarter. We also included estimates of staff benefit costs. For the utility sector, the BLS estimates that the cost of total benefits for employees in the utility sector makes up 38.7% of total compensation. Total benefits include costs associated with insurance and retirement benefits while wages and salaries include the employee's direct pay. We calculated the labor loading factor as:

$$Labor\ Loading\ Factor = 1 + \left(\frac{Total\ Benefits}{Wages\ and\ Salaries}\right)$$

In the case of the utility sector, the resulting labor loading factor is 1.63. We multiplied each of the unloaded labor rates from the BLS by this factor to arrive at a loaded labor rates. The evaluation team then multiplied the loaded labor rates by the estimated hours provided by the PA staff to arrive at the labor costs. Other factors could be considered in a labor loading factor, including the cost of employee paid leave but such information was not available and therefore not included.

Incremental Cost Allocation and Imputation

Incremental marketing and administrative costs varied in their rigor and level of detail. Some were invoice-based and quite detailed, while others were rough estimates. Some costs were at the PA and community level, while some were at a more aggregate level (e.g., by PA across all targeted communities). In order to perform the analysis by community and fuel type, the evaluation team used the following assumptions to allocate costs:

- In cases where PAs and implementers were unable to provide **incremental administrative costs** by community, we split them evenly across communities.
- In cases where **incremental incentives** were associated with savings across more than one fuel type, we allocated the costs to fuel types in proportion to each fuel type's contribution to overall savings.
- Incremental costs (incentives, marketing and administrative costs) associated with savings from other fuels were assigned to electric PAs for homes with no gas provider. Cases where a home had a gas provider and savings from other fuels were extremely rare. In those instances, we split costs in proportion to savings.

Furthermore, we were unable to obtain the electric portion of the incremental PA administrative costs for West Springfield. We assumed the same per-community costs as Eversource. Also, due to a change in the implementation contractor, we did not have access to the gas portion of implementation contractor

administrative costs in West Springfield. We therefore assumed the same per-community incremental costs as for Eversource.[1]

Cost Normalization and Final Cost Calculation

We calculated the total incremental costs by summing incremental marketing, incentive, and administrative costs and dividing them by participation and energy savings:

Total incremental costs/Participant=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/Participants[2]

Total incremental costs/kWh=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/kWh

Total incremental costs/Therm=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/therms

Total incremental costs/Other Fuels (MMBTU)=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/Other Fuels (MMBTU)

Total incremental costs/MMBTU=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/All Fuels (MMBTU)

Summary of Results

Combined, PAs spent an estimated additional $429,790 to administer the EN+ initiative relative to the standard HES program. Marketing and administrative costs represented the largest portion (84% combined) of the incremental costs. Total incremental costs vary considerably by PA, because of the differing number of communities targeted by each PA, the scope of the marketing efforts, as well as the differing numbers of targeted customers and resulting participation levels.

Table 1. Incremental Costs by Cost Type and by PA

Program Administrator	Incremental Marketing $	Incremental Incentive $	Incremental Administrative $	Total Incremental $
Berkshire Gas	$33,118	$17,585	$18,069	**$68,772**
Columbia Gas	$12,514	$0	$31,186	**$43,701**
Eversource	$65,984	$7,082	$58,119	**$131,185**
National Grid	$61,776	$44,778	$79,579	**$186,133**
Total	**$173,392**	**$69,445**	**$186,953**	**$429,790**

** Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

[1] We considered using the incremental implementation contractor costs for Berkshire Gas, but those costs were very similar to Eversource's.

[2] Participants are customers who completed an energy assessment.

Table 2 provides total incremental costs by targeted community. Total incremental costs are lowest for Hyde Park and Plymouth due to a small number of targeted customers and participants (discussed later in the memo), and are highest in Adams and North Adams due to a large number of targeted customers and resulting participants.

Table 2. Incremental Costs by Cost Type by Community

Community	Electric PA	Gas PA	Incremental Marketing $	Incremental Incentive $	Incremental Administrative $	Total Incremental $
Adams	National Grid	Berkshire Gas	$28,203	$25,956	$29,873	**$84,031**
Hyde Park	Eversource		$18,999	$962	$15,473	**$35,433**
Lowell	National Grid		$19,274	$6,931	$20,838	**$47,043**
North Adams	National Grid	Berkshire Gas	$34,678	$26,371	$29,873	**$90,922**
Plymouth	Eversource		$21,745	$2,903	$15,473	**$40,121**
Watertown	Eversource	National Grid	$25,148	$5,528	$28,765	**$59,440**
West Springfield	Eversource	Columbia Gas	$25,345	$795	$46,659	**$72,799**
Total			**$173,392**	**$69,445**	**$186,953**	**$429,790**

**Note that the sum of costs may be slightly off (not more than by $1) from the total costs due to rounding.*
***Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

To better compare incremental costs across PAs and communities and explore the reasons for cost differences, the evaluation team normalized them by the number of participants.[3] Table 3 provides per-participant incremental costs by cost category and by PA. Across all PAs, EN+ cost an extra $470 per-participant above the standard HES program. As can be seen in the table, per-participant costs are the lowest for Berkshire Gas and National Grid, and are the highest for Columbia Gas. Incremental costs for Columbia Gas are driven by high administrative costs. Administrative costs include costs associated with planning and designing the initiative, which consumed anywhere between 24% and 41% of the PA time. The incremental administrative cost category is the most prone to error due to rough estimates and data imputations.

Per-participant incremental marketing costs vary from $86 incurred by National Grid to $282 incurred by Eversource. Differences in incremental marketing costs are likely reflective of the total number of targeted customers (discussed further in this memo), the scope of marketing and outreach efforts, as well as success engaging customers with the initiative. Differences in costs could but do not necessarily reflect the relative success of marketing and outreach strategies. While PAs targeted similar communities, the demographic composition and the housing stock across communities could vary, possibly driving the ultimate success of engaging customers with the initiative.

Per-participant incremental incentives for National Grid and Berkshire Gas are twice as high as for Eversource. The reason for higher per-participant incremental incentives is because National Grid and Berkshire Gas customers were more likely to complete improvements for which enhanced incentives were

[3] For the purposes of this analysis, we define participants as customers who completed energy assessments.

offered than Eversource customers. Our analysis of the program tracking data did not identify any incremental incentives paid by Columbia Gas.

Community-based initiatives such as EN+ could place a heavier administrative burden on smaller PAs. Smaller service territories mean that the pool of customers to target as part of these initiatives is limited and therefore the energy savings achieved per staff hour spent coordinating and administering the initiative could be lower than what is possible for larger PAs. Furthermore, these initiatives could further constrain a smaller staff dedicated to administration and implementation of energy efficiency programs. Despite these expectations, we did not see a clear relationship between PA size and per-participant administrative costs. Berkshire Gas's (smaller PA) per participant incremental administrative costs are the lowest, and National Grid's (large PA) costs are the second lowest. It is important to note again that incremental administrative cost estimates may be the least valid, as they are mostly based on rough estimates.

Table 3. Per Participant Incremental Costs by PA

Program Administrator	Total Number of Participants*	Incremental Marketing $ Per Participant	Incremental Incentive $ Per Participant	Incremental Administrative $ Per Participant	Incremental Total $ Per Participant
Berkshire Gas	272	$122	$65	$66	$253
Columbia Gas	55	$228	$0	$567	$795
Eversource	234	$282	$30	$248	$561
National Grid	720	$86	$62	$111	$259
Total	**914**	**$190**	**$76**	**$205**	**$470**

**Participants are those who completed energy assessments. Note that the sum of participants by PA is higher than the total number of participants because a single customer could receive services from two PAs (gas and electric).*
***Note that the sum of costs may be slightly off (not more than by $1) from the total costs due to rounding.*
**** The data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

Table 4 provides per-customer and per-participant incremental costs by community.[4] Analysis of incremental costs per targeted customer and participant shows that they tend to be lower in larger communities.

[4] We do not show incremental costs per targeted customer because the total number of targeted customers for Gas PAs is not readily available to us.

Table 4. Per Customer and Per Participant Incremental Costs by Community

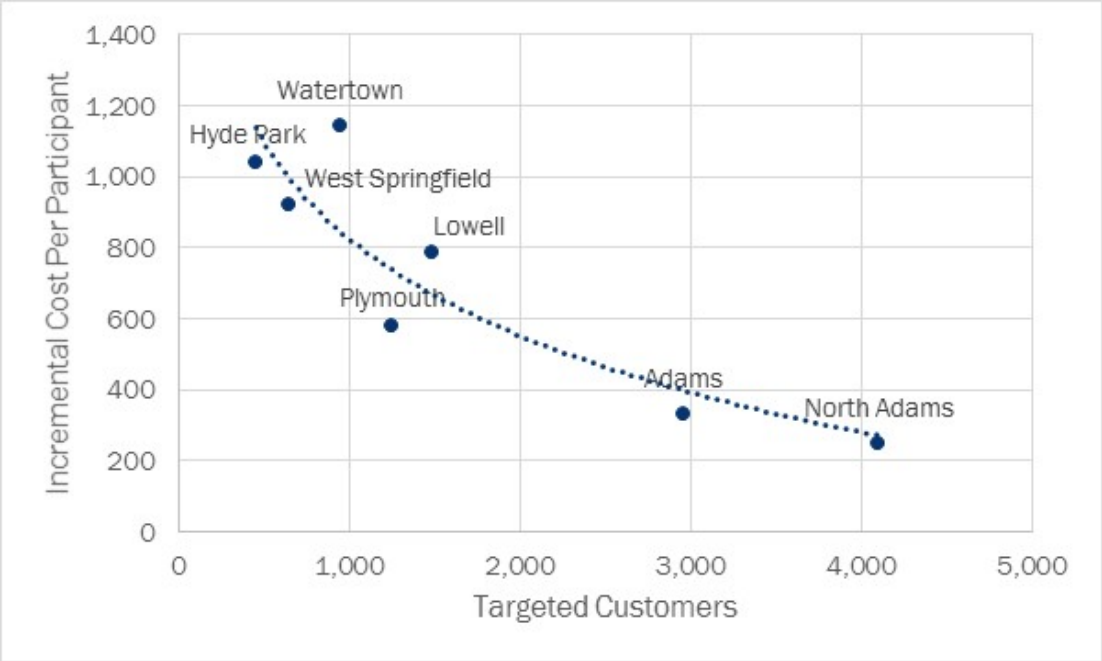
Community	Electric PA	Gas PA	Total Incr. $	Total Target Customers	Total Partici-pants*	Energy Assess-ment Rate	$ Per Targeted Customer	$ Per Participant
North Adams	National Grid	Berkshire Gas	90,922	4,098	367	9%	$22	$248
Adams	National Grid	Berkshire Gas	84,031	2,956	253	9%	$28	$332
Lowell	National Grid		47,043	1,483	60	4%	$32	$784
Plymouth	Eversource		40,121	1,250	69	6%	$32	$581
Watertown	Eversource	National Grid	59,440	948	52	5%	$63	$1,143
West Springfield	Eversource	Columbia Gas	72,799	639	79	12%	$114	$922
Hyde Park	Eversource		35,433	451	34	8%	$79	$1,042
Total			**429,790**	**11,825**	**914**	**8%**	**$36**	**$470**

**Participants are those who completed an energy assessment.*
***Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

Figure 1 plots communities by per-participant cost and total number of targeted customers. The trend in the chart illustrates the economies of scale achieved by targeting a larger number of customers. This trend is not surprising given that some of the costs either remain fixed as the number of targeted customers increases (such as planning and design costs, marketing and collateral development) or increase only incrementally (distribution of marketing and collateral to a larger group of customers). The results suggest that scaling up EN+ by either targeting more customers in a single community or engaging multiple communities will result in lower incremental cost per participant. The results, however, may not fully reflect the full potential for achieving economies of scale due to statewide implementation. As previously noted, the incremental costs reported here include start-up and design costs. Broader implementation will allow to spread these costs and amortize them over time. Furthermore, broader implementation of the initiative could lead to gaining efficiencies in administration procedures, systematization and concentration of staffing functions, recycling of marketing materials and strategies, etc.

Scaling the initiative, however, may not be a feasible option for smaller PAs whose service territory limits the number of customers and communities that they can engage. An example can be Unitil Gas and Electric whose service territory consists of four and six towns respectively.

Figure 1. Per-Participant Cost Relationship to the Number of Targeted Customers



Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.

Table 5 provides incremental costs normalized by energy savings achieved during the implementation of EN+ by PA.[5] We used energy savings values calculated as part of the 2014 EN+ Evaluation. Appendix of this memo contains savings by PA and by community.

Overall, incremental costs per kWh is $0.13 and the average cost per therm is $5.86. To put these costs in perspective, cost per annual kWh saved by the Residential program portfolio in Q4 2014 was $0.40, while cost per annual therm saved during the same time frame was $6.17.[6]

Our analysis shows that per-kWh costs incurred by Eversource are six times higher than those incurred by National Grid. Overall, National Grid achieved three times the amount of electric savings at nearly half the cost. This difference are due at least in part by a much larger number of targeted customers and participants in National Grid's communities. A part of the difference, however, can also be attributed to the relative success engaging customers with the initiative.

Per-therm costs also vary across PAs from a low of $3.66 for Berkshire Gas to a high of $10.19 for Columbia Gas. Berkshire Gas spent 57% more incrementally than Columbia Gas, but achieved 338% higher gas savings.

[5] Please note that we normalized incremental costs by total energy savings achieved through the initiative, and not net energy savings that are due to the initiative.

[6] http://ma-eeac.org/wordpress/wp-content/uploads/MA-EEAC-Consultant-Team-2016-18-Three-Year-Goals-Framework-Memo.pdf

A considerable portion of the PA incremental dollars was paid to achieve savings from other fuels. Over $39,000 was paid in incremental incentives for savings from other fuels. This amounts to 57% of all incremental incentive dollars and 9% of overall incremental costs.

Table 5. Incremental Costs per Unit of Energy by PA

Program Administrator	$ Per kWh	$ Per Therm	$ Per MMBTU (Other Fuels)	$ Per MMBTU (Total)
Berkshire Gas		$3.66		$36.63
Columbia Gas		$10.19		$101.89
Eversource	$0.35	$18.37	$68.56	$92.33
National Grid	$0.06	$6.57	$25.59	$30.23
Total	**$0.13**	**$5.86**	**$33.06**	**$43.48**

**Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

Table 6 provides incremental costs normalized by energy savings achieved during the implementation of EN+ by community. North Adams and Adams, the communities with the largest number of targeted customers, have the lowest incremental costs per MMBTU, while Hyde Park, the community with the lowest number of targeted customers, has the highest.

Table 6. Incremental Costs per Unit of Energy by PA

Community	Electric PA	Gas PA	$ Per kWh	$ Per Therm	$ Per MMBTU (Other Fuels)	$ Per MMBTU (Total)
North Adams	National Grid	Berkshire Gas	$0.05	$3.37	$21.07	$22.85
Adams	National Grid	Berkshire Gas	$0.06	$4.09	$29.54	$30.09
Plymouth	Eversource		$0.18	$0.17	$4.87	$53.76
Lowell	National Grid		$0.19	$0.16	$5.55	$61.03
Watertown	Eversource	National Grid	$0.31	$8.21	$106.40	$88.85
West Springfield	Eversource	Columbia Gas	$0.47	$10.19	$146.10	$114.11
Hyde Park	Eversource		$0.67	$0.66	$20.15	$192.58
Total			**$0.13**	**$5.86**	**$33.06**	**$43.48**

Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.

Conclusions and Considerations

Opinion Dynamics provides the following conclusions and considerations as a result of our data acquisition and analysis efforts:

- Incremental cost data were difficult to obtain and were often based on rough estimates. Incremental incentive data were not clearly tracked and required a considerable amount of time to parse out. Incremental administrative cost data were not tracked and therefore based on rough estimates from data provided for more than one community. Many of these difficulties were due to internal and external staffing changes and required the evaluation team to make assumptions when preparing the data. As a result, our confidence in the results and the conclusions we are able to draw is somewhat limited. However, if PAs were to put in place systems to track more data for future evaluations, the incremental costs of the initiative may be even higher.

- Despite uncertainties in the incremental cost estimates, the results of the analysis point to:

  - Considerable per-participant and per-unit of energy costs for the initiative. Across all PAs combined, the incremental costs per EN+ participant was $470, $0.13 per kWh and $5.86 per therm. To put these costs in perspective, cost per annual kWh saved by the Residential program portfolio in Q4 2014 was $0.40, while cost per annual therm saved during the same time frame was $6.17.[7]

  - Economies of scale might diminish incremental costs with an initiative expansion. Comparison of per-participant costs across communities revealed that as the number of targeted customers increased, per-participant costs decreased. This is not surprising because larger communities should have a larger absolute number of participants yet some of the costs either remain fixed as the number of targeted customers increases (such as planning and design costs, marketing and collateral development) or increase only incrementally (distribution of marketing and collateral to a larger group of customers). The results suggest that scaling up EN+ by either targeting more customers in a single community or engaging multiple communities will result in lower incremental costs per participant. The results, however do not account for additional gains in economies of scale due to statewide implementation (e.g., spreading and amortizing design and start-up costs, systematizing and centralizing staffing, recycling marketing, etc.). Scaling the initiative, however, may not be a feasible option for smaller PAs whose service territory limits the number of customers and communities that they can engage.

- As part of the initiative, PAs spent a considerable amount of incremental dollars to achieve savings for fuels other than gas and electric. More specifically, over $39,000 was paid in incremental incentives for savings from other fuels. This amounts to 57% of all incremental incentive dollars paid and 9% of overall incremental costs.

[7] http://ma-eeac.org/wordpress/wp-content/uploads/MA-EEAC-Consultant-Team-2016-18-Three-Year-Goals-Framework-Memo.pdf

Appendix A. Efficient Neighborhoods+ Energy Savings

This Appendix contains energy savings achieved during the implementation of the EN+ initiative by fuel type, by PA, and by Target Community. Note that these savings are not necessarily incremental to the initiative – they are a summary of savings that were achieved **during the course** of the initiative.

Table 7. Energy Savings by Fuel Type by PA

Program Administrator	kWh Saved	Therm Saved	Other Fuels Saved (MMBTU)	Total MMBTU Saved
Berkshire Gas		18,775		1,878
Columbia Gas		4,289		429
Eversource	173,991	1,220	706	1,421
National Grid	519,332	10,347	3,352	6,158
Total	**693,323**	**34,631**	**4,058**	**9,885**

Table 8. Energy Savings by Fuel Type by Community

Community	kWh Saved	Therm Saved	Other Fuels Saved (MMBTU)	Total MMBTU Saved
Adams	195,533	7,601	1,366	2,793
Hyde Park	19,019	1,078	6	179
Lowell	41,151	6,384	83	862
North Adams	282,648	11,174	1,898	3,979
Plymouth	62,415	142	538	765
Watertown	37,945	3,963	143	669
West Springfield	54,612	4,289	23	638
Total	**693,323**	**34,631**	**4,058**	**9,885**