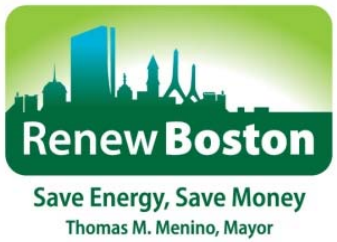

Chorus Foundation

Renew Boston Strategic Plan

February 5, 2013

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Introduction

In 2009, Mayor Thomas M. Menino created Renew Boston to ensure that all Bostonians maximize the benefits of energy efficiency and alternative energy. Renew Boston partners with local utilities and coordinates for-profit and non-profit partners to help Boston residents, businesses, and institutions save energy and money, reduce greenhouse gas emissions, and create demand for local green jobs. The Mayor simultaneously created his Climate Action Leadership Committee to recommend climate action goals for the entire Boston community and steps for reaching those goals. The City's 2010 Climate Action Plan set the goal for Boston to reduce its greenhouse gas (GHG) emissions 25% by 2020 and 80% by 2050. The Mayor directed Renew Boston to start its work before the Climate Action Leadership Committee set community GHG goals, knowing that building-related GHG emissions represent over two thirds of the community's emissions total and that building energy efficiency would constitute the single most important GHG mitigation goal in the City's Climate Action Plan.

Renew Boston ensured that most of the $6.5 million City's Energy Efficiency and Conservation Block Grant (EECBG), appropriated under the American Recovery and Reinvestment Act (ARRA) and administered by the U.S. Department of Energy (DOE), directly serve Boston's residents and small businesses. Now that EECBG funds have been spent, Renew Boston enters into a new phase (Renew Boston 3.0), and this Renew Boston Strategic Plan serves as both a report on program work to date and a plan for 2013-2015. Renew Boston is grateful for the support of its utility partners, NSTAR and National Grid, and foundation funders, the Barr Foundation, Chorus Foundation and The Boston Foundation.

Background

In December 2007, Mayor Thomas M. Menino issued his first Climate Action Plan and simultaneously directed his Office of Environmental and Energy Services to develop a comprehensive program to engage more Boston residents and businesses in energy efficiency and alternative energy. Earlier that year, the City of Cambridge launched the Cambridge Energy Alliance, a non-profit corporation envisioned as a City-sponsored Energy Service Company (ESCO), to lead outreach and marketing campaigns, raise debt financing, aggregate available public revenue streams, pre-qualify efficiency contractors for residential, commercial and industrial (C&I) and institutional projects, and select and oversee ESCO contractors. The City of Boston examined the energy alliance approach and decided that a single, City-sponsored non-profit ESCO was not the best way for the Mayor to fulfill his public promise to create an entity to deploy energy efficiency and alternative energy across Boston.

Renew Boston's decision to partner directly with local utilities coincided with the Commonwealth of Massachusetts's enactment of the Green Communities Act of 2008 (GCA), legislation that confirmed the Commonwealth's policy of relying primarily upon utilities to provide energy efficiency services funded by ratepayers through system benefit charges, proceeds of the Regional Greenhouse Gas Initiative auctions and other governmental resources. The GCA directed electric and natural gas utilities to help customers take all cost-effective measures for energy efficiency. Between 2010 and 2013, Boston ratepayers paid approximately $145 million to fund utility energy efficiency programs. Renew Boston was created to leverage these utility programs in order to achieve the aggressive clean energy strategies in the City of Boston

Climate Action Plan. From its inception, Renew Boston has been animated by the belief that municipal government is indispensable to ensure that the Commonwealth's aggressive energy programs reach often hard-to-reach, hard-to-serve urban residents and businesses.

Renew Boston 1.0, announced by Mayor Menino in June 2009, was the City's pilot residential program. Using $200,000 City-controlled funds, Renew Boston procured the services of an innovative new home performance contractor, Next Step Living, which had just located in Boston's Innovation District, and the Massachusetts Energy Consumers Alliance (Mass Energy). This program provided 169 residents within 60-120% median income with comprehensive energy efficiency services. In September 2009, Renew Boston underwent a comprehensive planning process with an Advisory Committee including the state, utilities, for profit and non-profit stakeholders, and all pertinent municipal departments that resulted in the formation of Phase I Recommendations presented to the Mayor in March 2010.

Starting in September 2010, Renew Boston 2.0 administered the City's energy efficiency grant under the American Recovery and Reinvestment Act. Under Boston's EECBG, $2 million served 1,750 residents within 60-120% median income with no-cost weatherization, $1 million served 700 small businesses, and $1.1 million provided funding for six low-income multi-family energy efficiency projects. Renew Boston extended the no-cost insulation offer to 510 more families (who signed up by the deadline of December 2011) with an additional $500,000 of City funds, for a total of 2,260 no-cost insulation projects.

Boston's EECGB also seed-funded a municipal energy office with a project manager and an administration and finance manager now permanently on staff, funded a 94.5 kW photo-voltaic solar energy installation at the City's Archives Building, supported a small residential solar program, and provided $600,000 towards the City's comprehensive conversion of its streetlights to LED technology. Renew Boston succeeded in driving the demand for green jobs: Next Step Living also won the procurement to be the Renew Boston 2.0 residential program home performance contractor and reports that EECBG program funding was key to its growth from 25 employees in 2009 to over 400 employees today.

Renew Boston's key innovation is the partnership with its electric utility, NSTAR, which loans the program the full-time services of a program manager, and its natural gas utility, National Grid. Both utility partners provide funding to support Renew Boston's community outreach work and serve on the Renew Boston Strategy Board. These utility partnerships support both Renew Boston's work with Boston's residents, businesses and institutions and the City's aggressive municipal governmental energy reduction goals.

Renew Boston has also demonstrating to State government the need for municipal energy efficiency and alternative energy programs to achieve community goals. The City worked with the Commonwealth of Massachusetts to ensure that Renew Boston and similar municipal programs are supported in the utilities' three-year plans for 2013-2016. The City also worked with the State Legislature to revise the membership of the Energy Efficiency Advisory Council, created by the GCA to oversee the utilities' three-year planning process, to include a seat for municipal government and in 2012 was designated by the Department of Public Utilities to serve for a five-year term.

Executive Summary

Renew Boston began serving Bostonians in mid-2010, building on a new partnership between the City and its two utilities, in which the City has assisted efficiency providers to succeed in Boston. By 2011, most of the program activity had ramped up and significant results were achieved in that year, with record-breaking participation by all sectors, leading to energy savings that met Renew Boston's target savings.

For the residential sector, key results include:

- Renew Boston met the participation goal set in 2010 to double the level of residential participation in all utility residential energy efficiency programs, by increasing to an average of 6.8% per year for the three-year period 2010 through 2012 from the 3% level of the previous three years.
- Over 18,000 Bostonians signed up for Renew Boston, to discuss arranging a Home Energy Assessment. This is 8.5% of Boston households. Six neighborhoods exceeded this average, with signups in the 10-15% range.
- The penetration of Home Energy Assessments in Boston (as an annual percentage of customers in one to four-family homes) tripled from a level of 1.4% in 2010 to 4.1% in both 2011 and 2012.
- Boston also more than tripled the penetration of insulation and air sealing (collectively called "weatherization") from 600 housing units in 2010 to an average of 2,050 units in 2011 and 2012.
- Respondents to two surveys reported high levels of trust in Renew Boston and its outreach and partner organizations.

The Renew Boston Small Business initiative increased the number of Boston participants in the Direct Install program by 550 customers in 2011, an increase of 73%. For all Boston C&I customers in 2011, large and small, electricity savings totaled 131 GWh, 100% of the savings target for that year, and natural gas savings were 2.3 million therms, substantially above the target.

Now that the EECBG stimulus funding has been spent, new initiatives will be needed to achieve the necessary participation of residential and small business customers on an ongoing basis. For example, the residential no-cost insulation offer, with a massive outreach campaign, created a dramatic ramp-up of energy assessments and insulation in late 2011, and it is not yet clear what level of participation will be sustainable after the stimulus funding. This need for new initiatives for residential and small business constituents is one reason for this Strategic Plan.

Another reason for this Plan is that, despite the welcome progress in participation and energy savings in 2011 and 2012, citywide metrics of electricity usage in 2012 were above the target consumption levels, as described in Section 2 of this Plan. There are at least two reasons that citywide metrics of electricity use have been above the consumption target:

- Load growth has resumed after the impact of the Great Recession in 2009 and 2010, and energy savings must cover those load increases in addition to meeting savings goals such as those of the utility energy efficiency programs (which do not take load growth into consideration).

- There is also a lag between installation of energy saving measures and the reduction in energy use, which are only measured in the next full year.

Renew Boston has always been performance-based, with systematic tracking of actual reductions in energy use against annual targets to determine the extent to which strategic changes are needed for the City to stay on track to meet the 25% greenhouse gas emissions reduction goal by 2020. Renew Boston has found that, in order to remedy the above-target 2012 level of electricity use, reductions in usage must improve to 2.6%/year to reach the 2020 target. To also cover load growth at the level of 1.5%, electricity savings must reach 4.1% in 2013. This translates to a savings target of 290 GWh in 2013, which is beyond the best savings achieve to date: 150 GWh savings in 2012. These changes in the targets for future years are addressed in Section 2 of this Plan. These metrics are Renew Boston energy savings and use targets, which are understood to be different types of targets than the savings goals of the utility efficiency programs, as has been discussed by the Strategy Board.

Citywide natural gas use was below the target in 2011. Further analysis will be needed of the extent to which oil conversions and CHP may reduce GHG emissions, and of the effect of weather, before future gas targets are adjusted to get back on track to the 2020 goals.

The need to accelerate energy savings in order to get on track to the Mayor's 2020 goals will require enhancements and additions to the strategies pursued to date by Renew Boston. Enhancements are presented in this Plan for the three existing Strategies:

- Strategy 1: Tracking of Progress and Strategy
- Strategy 2: City-Utility Alignment
- Strategy 3: Targeted Outreach Campaign & Network.

The first strategy is the foundation of performance tracking, to determine the extent to which the City is on track to achieve its energy targets, and to work through the Strategy Board to identify needed improvements. The second strategy is alignment between the City and NSTAR and National Grid to coordinate their respective and joint services. The third strategy is based on the City's role as a catalyst to build a network of partners and participants that can achieve more than the City or the utilities alone.

This Plan also introduces a new strategy:

- Strategy 4: The Greenovation Lab.

This new strategy is a set of Initiatives designed to achieve the broader and deeper energy savings that will be needed in the coming years. This strategy is called the "Greenovation Lab" because it will include testing of new approaches, with potential application for other cities if successful in Boston. "Greenovate Boston" is a collective movement catalyzed by Mayor Menino to ensure a greener, healthier, and more prosperous future for the city by meeting the City's GHG goals. Renew Boston is a Greenovate Boston Initiative.

In the residential sector, two of these new Initiatives are directed at savings measures with which the existing programs have had little or no success: furnace and boiler replacements, with a further focus on 2-4 family buildings. Another residential initiative under Strategy 4 will use new IT,

web and mobile technologies not only to increase participation in standard efficiency programs (such as home energy assessments), but more importantly to drive behavior change through social marketing.

For commercial, industrial and institutional energy users, Strategy 4 will include work with the three Sector Working Groups of the Green Ribbon Commission, which include members of the Commercial Real Estate, Health Care, and Higher Education sectors. The C&I Greenovation Lab will also include the Building Energy Disclosure Ordinance for large commercial and residential buildings and other initiatives on District Energy Planning, CHP and Business Financing.

Section 2. Targets and Metrics

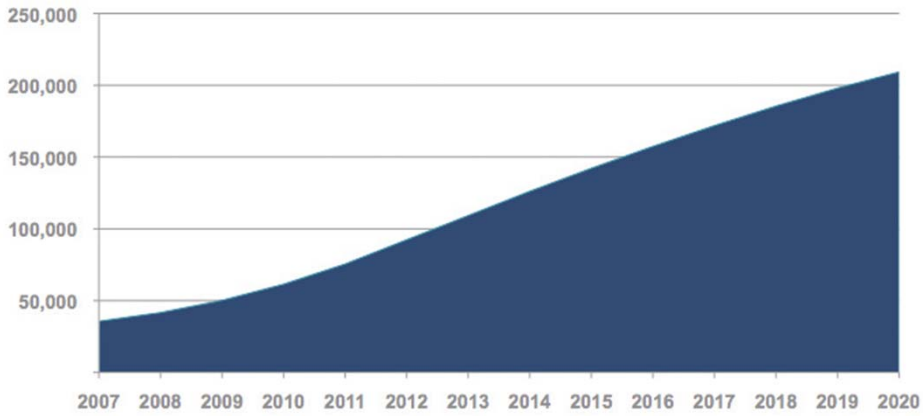
Renew Boston is tracking actual reductions in energy use, not just energy savings, to connect with the Mayor's Climate Action Plan goal.

1. Progress on Renew Boston Targets Set in March 2010

In 2010 the Mayor set the goal of a 25% reduction by 2020 in greenhouse gas (GHG) emissions and approved three Renew Boston targets as important contributions to achieve that GHG goal:

1. Residential Participation Targets:
   - Double the level of residential participation in energy efficiency programs from approximately 3%/year over the last 3 years (2007-2009) to 6%/year over the next 3 years (2010-2012)
     - This target was exceeded with 6.8% annual participation, as documented in Figure A-1 in the Appendix.
   - Maintain annual participation at the level of 15,000 households/year through 2017, and
   - Involve 150,000 households between 2010 and 2020 in some energy efficiency activities.

Figure 1: Residential Participation Target (Households)



2. Energy Savings Targets:
   - 2012 Savings Target: save 430 million kWh of electricity, which is 6.4% of city-wide consumption, plus 4.5 million therms of natural gas, from 2010 through 2012.
     - The actual electricity savings are estimated to have been 380 million kWh of savings over the 3 years, which is 88% of the target savings.
     - Savings of natural gas are estimated to have been 11 million therms, over twice the target.
3. Electricity Consumption Targets:
   - 2012 Electricity Use Target: 6,704 million kWh
     - Actual usage in 2012 is estimated at 7,206 GWh, which is 7.5% above the target.
   - Electricity use has been above the consumption target from 2010 through and 2012, despite meeting the savings goals. This is primarily because, after the impact of the recession, load growth has resumed in 2010.
     - There is also a lag between installation of energy saving measures (when the savings are recorded) and the reduction in energy use, which is only experienced fully in the next year.

Based on these results to date, the next section will address the need to:

- Update electricity use reduction targets to "catch up" to a trajectory that will support the 2020 GHG goal, and
- Update energy savings targets to cover load increases in addition to meeting savings goals such as those of the utility energy efficiency programs (which do not take load growth into consideration).

Since citywide electricity use in 2012 was above the target, reductions must improve to 2.6%/year to reach the 2020 target. Future energy savings must reach 4.1%/year to also cover load growth, for a 2013 savings target of 290 GWh.

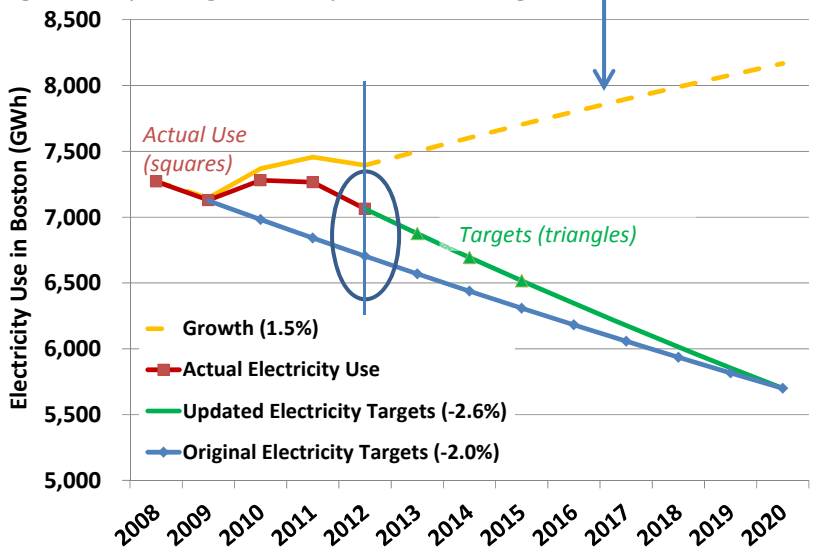
2. Updating Electricity Use and Savings Targets

- Actual city-wide usage in 2012 is estimated at 7,063 GWh, as shown in column 4 of Figure 2 and in the red middle line with squares in Figure 3 (see circles).
  - This usage reflects a 2.8% reduction in 2012 usage (column 3), likely the result of the recent dramatic increases in savings through the utility efficiency programs (columns 7-8).
- To catch up with progress required to meet the 2020 target from the actual 2012 level, the rate of reduction must improve to 2.6%/year (see columns 3-4 and the green line), compared to the 2% rate of the original target (columns 1-2 and the bottom blue line).
  - This new rate of reduction can now be applied to actual 2012 use to create a new electricity consumption target of 6,880 GWh for 2013 (column 4).
- The annual reductions required to meet the new use targets are shown in column 5. However, these reductions will not be sufficient to cover load growth, which is projected in column 6. Renew Boston is using a load growth rate of 1.5% (illustrated in the top dashed line of Figure 3) to cover the following considerations:
  - The underlying growth across the ISO-NE region,
  - The higher economic growth in the Boston area,
  - The City's policy to attract jobs and population growth.
- To achieve the 2.6% reduction and cover 1.5% load growth will require a new savings target of 4.1%, as shown in columns 7 and 8. This means savings of 290 GWh in 2013 – almost double the 150 GWh savings in 2012 – highlighting the need for the Strategic Initiatives in Sections 4 and 5 below.

Figure 2: Updating Electric Savings Targets to Allow for Load Growth

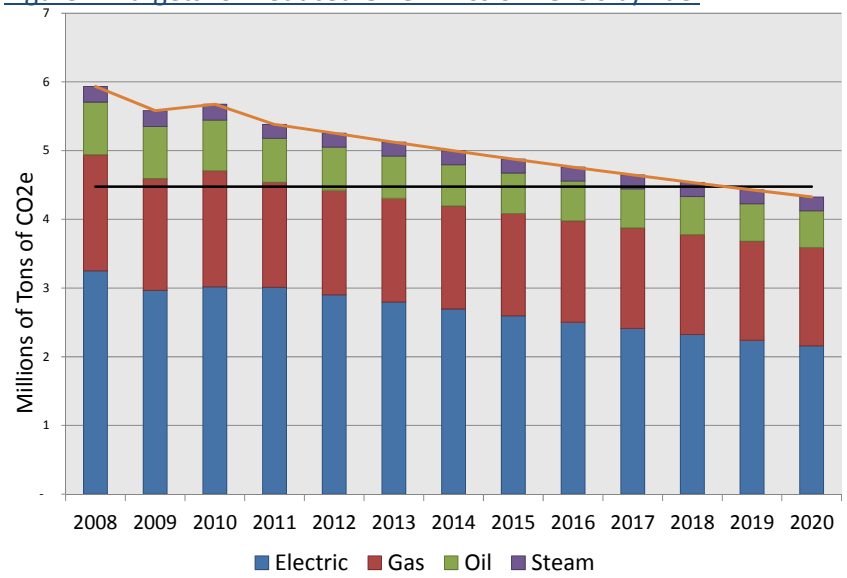
	1	2	3	4	5	6	7	8
	Original Target Use (GWh)		Actual Use (GWh)		Actual Reductions (GWh)		Actual Savings (GWh)	Savings %
2008		7,271		7,271				
2009	-2.0%	7,120	-1.9%	7,129	141		70	1.0%
2010	-2.0%	6,980	2.1%	7,280	-150		90	1.3%
2011	-2.0%	6,840	-0.2%	7,266	14		140	1.9%
2012	-2.0%	6,700	-2.8%	7,063	203		150	2.1%
	-2.0%		Updated Targets		Required Reductions (2.6%)	Load Growth (1.5%)	Required Savings (4.1%)	
2013	-2.0%	6,570	-2.6%	6,880	180	110	290	4.1%
2014	-2.0%	6,440	-2.6%	6,700	180	100	280	4.1%
2015	-2.0%	6,310	-2.6%	6,520	180	100	280	4.1%
2016	-2.0%	6,180	-2.6%	6,350	170	100	270	4.1%
2017	-2.0%	6,060	-2.6%	6,180	170	100	270	4.1%
2018	-2.0%	5,940	-2.6%	6,020	160	90	250	4.1%
2019	-2.0%	5,820	-2.6%	5,860	160	90	250	4.1%
2020	-2.0%	5,700	-2.6%	5,700	160	90	250	4.1%

Figure 3: Updating Electricity Reduction Targets



- The Renew Boston energy savings and consumption targets discussed above will not coincide with the savings goals of the utility efficiency programs, as discussed in Strategy Board meeting #6 in November 2012. The City and its utility partners in Renew Boston can collaborate on the development and implementation of the Initiatives in this Strategic Plan, while each referencing their own individual goals and metrics.
    - The consumption targets set by Renew Boston, like the Mayor's Climate Action Plan goals, are inclusive of load growth. In other words, the targets are to bring the use of energy down to the specified levels regardless of the extent to which users have increased their operating hours, or have purchased additional equipment or expanded the size of their buildings.

Figure 4: Targets for Reduced GHG Emission Levels by Fuel



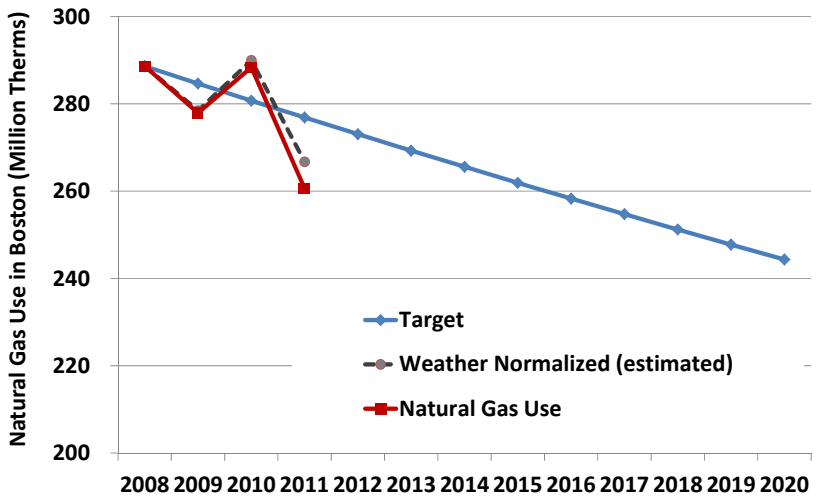
- The energy use targets for each year are set at the level required to bring GHG emissions down to a trajectory toward the 2020 emission goals.
    - In order to achieve the 25% reduction in GHG emissions by 2020, emissions from each energy type will have to be reduced to the levels charted in Figure 4 to the left.
- The most rapid rate of emission reduction is for electricity, as shown in Figure 4, where emissions from electricity use and generation are in the blue bar segments at the bottom of the chart.
    - To achieve these GHG reductions, electricity usage must be reduced and/or the GHG emission factors must be correspondingly lower.
        - One way to reduce the emission factors for electricity is to increase the use of clean renewable energy.
        - In recent years, emission factors have been improving due to factors such as the decline in natural gas prices, although most of these factors are outside of the control of the City.
    - The electricity use targets in column 2 of Figure 2 were derived from the GHG reductions in Figure 4, with the additional assumption that emission factors will improve by 1.0%/year.
- Natural gas consumption and targets are addressed in the next section.

Citywide natural gas use was below the target in 2011. Further analysis will be needed to determine the extent to which oil conversions and CHP will and should reduce GHG emissions, before future gas targets are adjusted.

3. Natural Gas Consumption Trends

- The use of natural gas in Boston will be determined not just by the factors discussed above for electricity, but also by:
  - recent and future switching to natural gas from other fuels, and
  - the effect of fluctuating weather on use of natural gas for space heating.
- The original consumption targets for natural gas are illustrated in the blue line in Figure 5 below.
  - Preliminary targets were developed based on the emission targets in Figure 4 above, without an analysis of the pace of switching to gas. Therefore, Renew Boston plans to work closely with National Grid, the City's gas utility, to develop new future targets for use and emissions of natural gas.

Figure 5: Natural gas consumption through 2011 compared with target



- The preliminary 2020 natural gas consumption target is 244 million therms -- a reduction of 15.4% from 2008, which requires a reduction of 1.4%/year in consumption.
  - The use target for 2011 was 277 million therms. Actual usage in 2011 was 261 million therms. These metrics are illustrated in Figure 5.
    - Most of the gas burned to generate steam is not included in these figures (partly because the resulting emissions are classified under steam for the City's emissions inventory).
  - As noted above for electricity, these gas use targets are *Renew Boston* targets, which will not necessarily coincide with the savings goals of the utilities.
- Comparing annual natural gas use to the annual consumption target for natural gas presents different challenges from the corresponding comparison for electricity.
  - The warm winter of 2011 may have brought gas use down somewhat. Figure 5 includes a dashed line which uses statewide heating degree days to normalize the 60% of gas use for heating and low-load-factor uses.
  - The substantial shift from oil to gas for space heating, has driven gas consumption up while driving GHG emissions down. CHP has the same general effects. The Renew Boston Residential and C&I Working Groups will be tasked during 2013 to quantify these impacts, past and future, and propose adjustments to the targets for natural gas use. Pending these adjustments, no changes have been made in the 2013 or other future targets for natural gas usage or savings.

Strategy 1: Tracking of Progress and Strategy

The Renew Boston Strategy Board was established to:

1. Track results to assess need for strategic changes.
    - City-wide tracking of energy use is the subject of Section 2; tracking of residential participation and C&I sector savings is detailed in sections below.
    - An "**Annual Savings Update**" will be prepared for each spring Strategy Board meeting on savings and usage reductions through the previous year, incorporating findings on the need for program rampup to meet Renew Boston's annual targets and to be on track to meet the Mayor's 2020 goal.
2. Discuss strategic options and implementation approaches when changes in strategy are required to improve results.
    - Renew Boston strategy is introduced in this section, with 19 Initiatives addressed in Sections 4 and 5.
    - A "**Strategic Plan Update**" will be presented to the Strategy Board meeting each fall to identify any changes needed and planned to the Initiatives for implementation in the next year.

Strategy 2: City-Utility Alignment

In 2010, the City charted a strategy for Renew Boston that was explicitly based on alignment with the energy efficiency programs of the utilities that serve Boston, NSTAR (electricity) and National Grid (natural gas). The City and the utilities have pursued this alignment through effective coordination at all levels, through the work of the Renew Boston Utility Program Manager (NSTAR employee on loan to the City), and through the establishment in 2012 of the Residential and C&I Working Groups.

Strategy 3: Targeted Outreach Campaign & Network

Boston has a unique mix of energy users, buildings and neighborhoods. To involve all the parts of the city, and to reach more constituents than would have been possible with only the resources of the utility programs, Renew Boston has:

- catalyzed a network comprised of the many Boston organizations that have deep relationships with energy users and building owners, along with outreach and service delivery partners, and
- tailored outreach campaigns to the needs of each group of constituents.

Strategy 4: Greenovation Lab

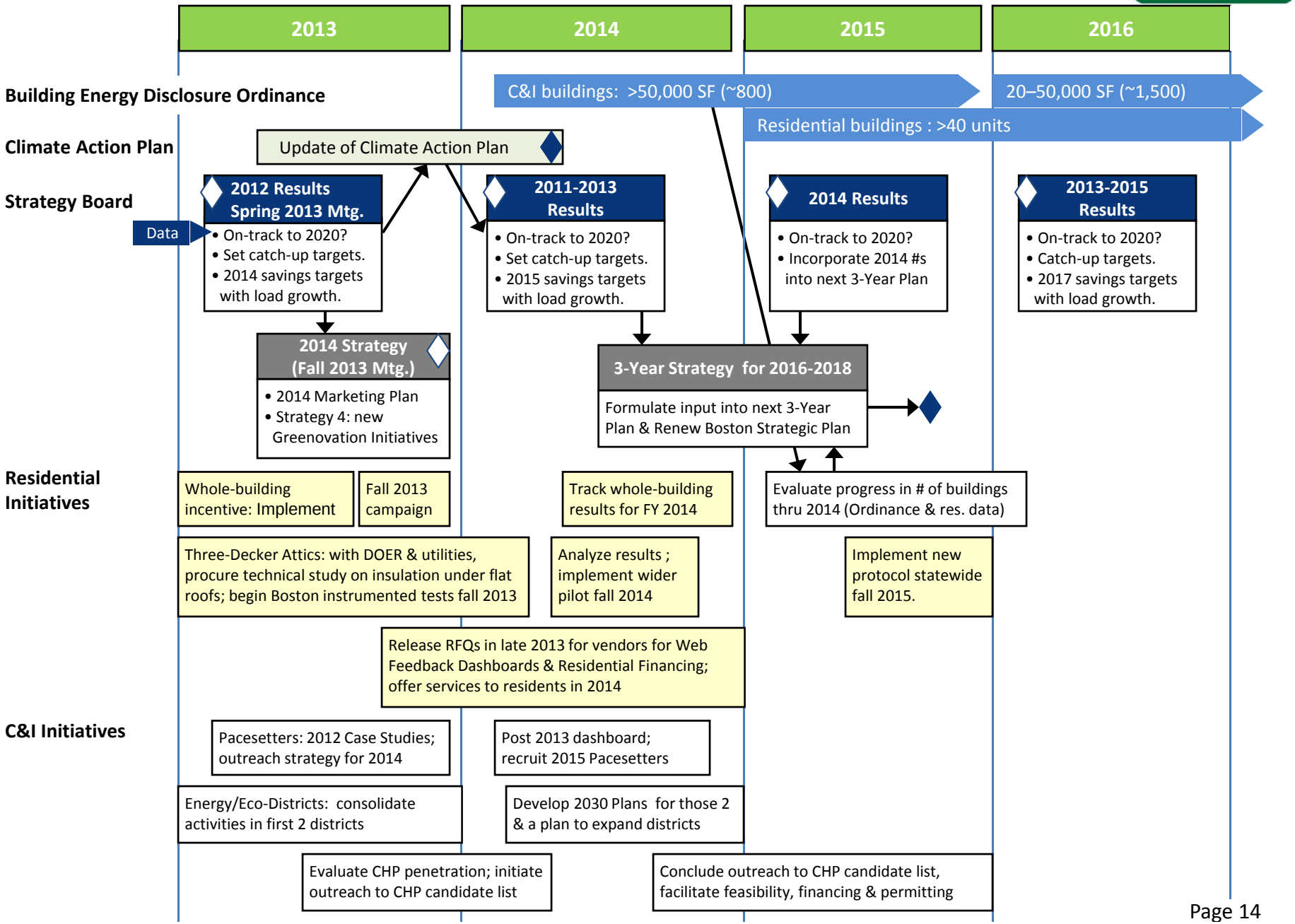
The premise of Strategy 4 is that the City's Climate Action Plan will likely require increasing levels of energy savings in the coming years.

- As explained in Section 2, electricity consumption has been above target levels from 2010 through 2012. While Strategies 1 through 3 can be enhanced to increase savings, that may not be sufficient to keep the City on track to the 2020 GHG reduction goals, especially when load growth is taken into consideration.
- In addition, further evaluation will be needed to confirm how much energy will really be saved by Strategies 1 through 3 and how much that will reduce actual energy use. Pending that analysis, Strategy 4 will provide insurance to backstop the first three.

Figure 6: Strategy Matrix with 19 Renew Boston Initiatives

4 Strategies	C&I Initiatives	Residential Initiatives
1) <u>Tracking of Progress and Strategy</u> *Strategy Board tracking of metrics to identify need for strategic changes*	1. Sector Targeting and Tracking 2. Municipal Energy Unit	1. Targeting through Data Mining 2. Building and Neighborhood Tracking
2) <u>City-Utility Alignment</u> *Coordinating with utilities*	3. Renew Boston Utility Program Manager 4. Renew Boston C&I Working Group	3. Residential Working Group
3) <u>Targeted Outreach Campaign & Network</u> *Involving all the parts of the City to reach more constituents*	5. Renew Boston Small Business 6. Green Ribbon Commission (GRC) 7. Pacesetter Initiative	4. Renew Boston 3.0 5. Green Affordable Housing Program for Multi-Family Buildings
4) <u>Greenovation Lab</u> *Developing ways to increase savings*	8. GRC Sector Working Groups 9. Building Energy Disclosure Ordinance 10. District Energy Planning, CHP and Business Financing	6. Three-Decker HVAC 7. Three-Decker Attic Insulation 8. Web Feedback Dashboards 9. Homeowner Financing

Figure 7: Schedule of Key Renew Boston Milestones



Contents of Section 4

As stated in the March 2010 Phase 1 Report, "The city has developed Renew Boston to serve all types of buildings all across the city. At the beginning of implementation, it will be necessary to target [C&I] outreach to … those categories of non-residential buildings with the greatest potential to save large quantities of energy and contribute to achieving the city-wide goals." That report identified the following C&I targets:

- Small businesses, nonprofits and multi-family (>4 unit) buildings that are served by the Department of Neighborhood Development,
- Property owners/managers with the largest savings opportunities, and
- Large hospitals and universities.

The strategies for C&I energy users have matured since the March 2010 Phase 1 Recommendations. In the second Strategy Board meeting in June of 2011, the C&I initiatives were differentiated by size and included the following for the largest energy users, using current numbering for Initiatives:

- Initiative 3, Renew Boston Utility Program Manager
- Initiative 8, GRC Sector Working Groups.

The following were included for mid-sized customers:

- Initiative 1/8, Sector strategy (e.g. university, health, office)
- Initiative 10, District Strategy.

This Strategic Plan adds a new framework and the following:

- Initiative 4, C&I Working Group
- Initiative 7, Pacesetter Initiative
- Initiative 9, Building Energy Disclosure Ordinance
- Initiative 11, Business Financing.

Strategy 1: Tracking of Progress and Strategy -- C&I

Initiative 1: Sector Targeting and Tracking

1. Sector Targeting Approach to Date. The City of Boston and its two utility partners have jointly developed an approach for Renew Boston to target its work with commercial and industrial energy users that is both innovative and practical, with the following four elements:
   a) The City and the utilities will coordinate closely through the Renew Boston Utility Program Manager as the single Point of Contact between them on matters pertaining to individual customers. This relationship is described further under C&I Initiative 3 below.
   b) The utilities will continue their ongoing relationships with their customers, including working toward multi-year MOUs with appropriate customers, and the City will not get in the middle between the utility account managers and their customers.
   c) The City and the utilities, as members of the Green Ribbon Commission, will encourage other members who are energy customers to arrange for their C-Level executives to engage with the utilities to move forward on energy efficiency.
   d) Renew Boston will work with the utilities to track and understand the energy use and savings in the sectors which account for most of the city's potential energy savings. Seven sectors of particular interest are listed below with their energy use and savings for 2011. The first three are addressed by the GRC Sector Working Groups discussed under Initiative 8 below.
      - The Commercial Real Estate sector likely uses more energy than indicated if all tenant accounts are included.

Figure C-1

	Electricity			Natural Gas		
Sectors	2011 Usage (MWh)	2011 Savings		2011 Usage (000 therms)	2011 Savings	
Commercial Real Estate	702,227	9,320	1.3%	17,336	272	1.6%
University	692,127	5,375	0.8%	15,081	16	0.1%
Healthcare	524,300	8,617	1.6%	9,604	967	10.1%
Other Government	362,477	5,983	1.7%	13,504	-	0.0%
Industrial	293,979	5,741	2.0%	9,810	-	0.0%
Municipal	268,080	12,386	4.6%	12,509	361	2.9%
Hospitality	196,633	8,617	4.4%	5,527	29	0.5%

Source: NSTAR, National Grid. Savings achieved in Boston are gross, not net. Sector categories are not identical in all cases: electricity usage data, and all natural gas data, use one set of sector categories, while electricity savings data uses newer "segments." Data reported here is limited to the largest customers, so there is some usage and savings in each sector in addition to that than reported here; this effect is more pronounced for natural gas.

Initiative 1: Sector Targeting and Tracking (continued)

2. Targeting the Greatest Energy Use

a) Electricity Use. The seven sectors listed in the table on the previous page accounted for at least 60% of 2011 C&I electricity use. For comparison, Figure C-2 below lists all the market segments, using NSTAR's recently enhanced categories (not the same as used in the table above). Within many of these segments, there are a few very large customers, as illustrated by Figure C-3 to the right.

Figure C-2

		Usage (MWh)	Accounts	Average Usage
GRC-Related Segments	Real Estate Management	910,200	6,635	137
	Educational	692,100	1,153	600
	Hospital	524,300	429	1,222
	Government Agency	476,900	6,438	
	Financial	363,800	1,439	253
	Lodging	196,600	161	1,221
Technology & Industrial	Data Center	54,600	8	6,825
	Computers & Electronics	40,200	261	154
	Software & Internet	7,500	62	121
	Food & Beverage	55,400	207	268
	Phamacutical	41,800	16	2,613
	Research Laboratory	13,300	52	256
	Other Industrial	156,600	240	653
Other	Retail	491,100	3,827	128
	Professional Service	313,500	14,802	21
	Communication, Entertainment	217,200	1,967	110
	Public Assembly	117,900	96	1,228
	Medical Office	67,400	415	162
	Long Term Care Facilities	19,300	89	217
	Other Institution	116,700	665	175
	Other / NA	156,500	10,435	15
Grand Total		5,033,000	49,397	102

Figure C-3, Largest Electricity Customers (Phase 1 Report)

		umber of ustomers
1	Real Estate	58
2	Hospital	28
3	University	27
4	Government	20
5	Financial	11
6	Communications	11
7	Hotel	13
8	Industrial	4
9	Boston (incl. BHA)	9
10	Sports, Assembly	6
		187

b) Gas Use. These seven key sectors accounted for 40% of total C&I natural gas use, or 82% of the gas used by the large customers for which sectors (other than utilities, such as district energy systems) had been identified. Figure C-4 below lists the market sectors used for this 2011 analysis.

Figure C-4

		Usage (000 Therms)	Accounts	Average Usage
GRC Related Segments	Property Management	17,336	135	128
	Colleges and Universities	15,081	48	314
	Hospital	9,604	24	400
	Cities & Towns	12,509	82	153
	State	12,399	29	428
	Federal	1,105	7	158
	Financial/Insurance	269	2	134
	Hotel	5,527	34	163
Technology & Industrial	Industrial Manufacturing	9,810	2	4,905
	Biotech	4,075	3	1,358
Other	Retail	1,706	17	100
	Utilities	75,140	3	25,047
	Other	13,433	163	82
	Fourth quartile, Not classified	59,367	12,619	5
Grand Total		237,360	13,168	

Initiative 1: Sector Targeting and Tracking (continued)

3. Targeting the Greatest Savings Opportunities

a) The Health Care and Higher Education sectors have substantial remaining opportunities for energy savings, according to the statewide Point 380 Market Opportunity Model results presented by the utilities to the state Energy Efficiency Advisory Committee (EEAC) on February 14, 2012, illustrated in the accompanying pie charts.

- Higher Education represents 14% of the opportunity for electricity savings and 7% of the opportunity for gas savings.
- Health Care represents 15% of the opportunity for electricity savings and 10% of the opportunity for gas savings.

b) The Commercial Real Estate sector is not identified in this Point 380 study, but "offices (both small and large) represent nearly 38% of the electric savings opportunity and 55% of the gas savings opportunity."

- The importance of this sector is underscored by the Waypoint Study on Commercial Office Space, conducted for the utilities and the Green Ribbon Commission, which estimated electric use for all Class A buildings in Boston to be 1,040,000 MWh (see Figure C-6 below).

Figure C-5

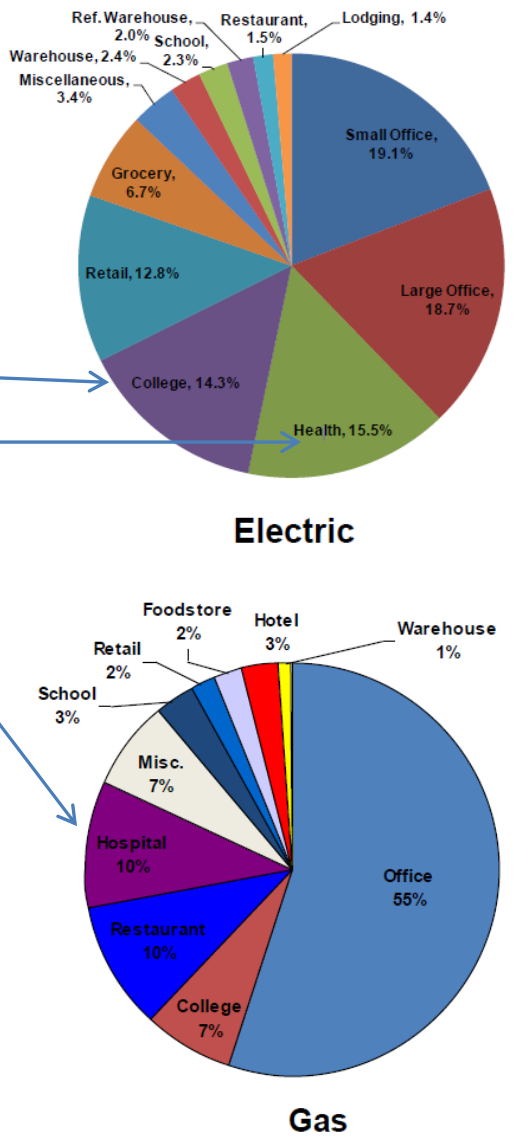


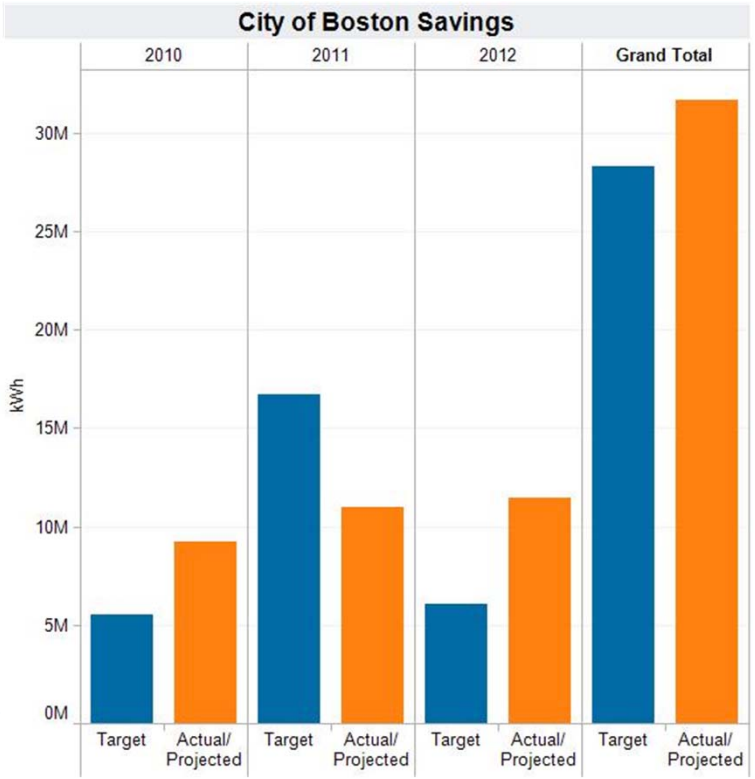
Figure C-6

Building Segment	Current Estimated Energy Usage (kWh)	Estimated Current Level of Efficiency (kWh/sq. foot)
Sample Buildings	279,710,327	20.1
Top 55	779,754,839	22.2
All Class A	1,040,614,886	22.9

Initiative 2: <u>Municipal Energy Unit</u>

- In 2011, the City created a municipal energy unit and, with seed-funding from the Energy Efficiency and Conservation Block Grant (EECBG), hired a project manager and an administration and finance manager to work with the Renew Boston Utility Program Manager, the NSTAR employee on loan to the City.
- The Unit, responsible for developing and meeting the City's energy efficiency goals and coordinating the City's energy efficiency, works closely with utility partners NSTAR and National Grid, the City's Office of Budget Management and the various City departments responsible for property management and construction.
    - The Unit coordinates energy project planning to integrate utility rebate funding with the City's capital budget and has standardized processes under the Green Communities Act's new energy procurement provisions that streamline the City's capacity to fund and complete energy efficiency projects.
    - The Unit is currently working to select an Energy Enterprise Asset Management System for all City-owned facilities.
    - In September 2012, when the City's EECBG program ended, both Unit members were put on the City's payroll.
- In 2010, the City and NSTAR agreed to scheduled savings targets for calendar years 2010-2012, shown in Figure C-6 to the right.
    - Much of the energy savings (31,623,201 kWhs) and the over $7 million in NSTAR rebate funding in those years came from the City's street light retrofit program, as illustrated in the charts on the next page.

Figure C-6



Initiative 2: Municipal Energy Unit (continued)

- For 2013-2015, the City and NSTAR have again set aggressive electricity savings targets.
  - These goals are shown in the table below (Figure C-7) and in the line chart (Figure C-8).
  - Figure C-8 also shows cumulative savings beginning in 2010 as a percent of FY2008 electricity use.
- The City is currently working with National Grid to set natural gas savings targets and to integrate National Grid rebate funding with the City's budget processes.
- The City's goal is to reduce actual consumption of each fuel type and total annual GHG emissions.
  - The City's use to date is shown in the bar chart to the right (Figure C-9).
    - The electricity bars are shown in site energy use, not including fuel use to generate the electricity.
    - The orange bars to the right consist primarily of natural gas but also include oil and steam use.

Figure C-9: Annual Consumption in Municipal Accounts (MMBTU)

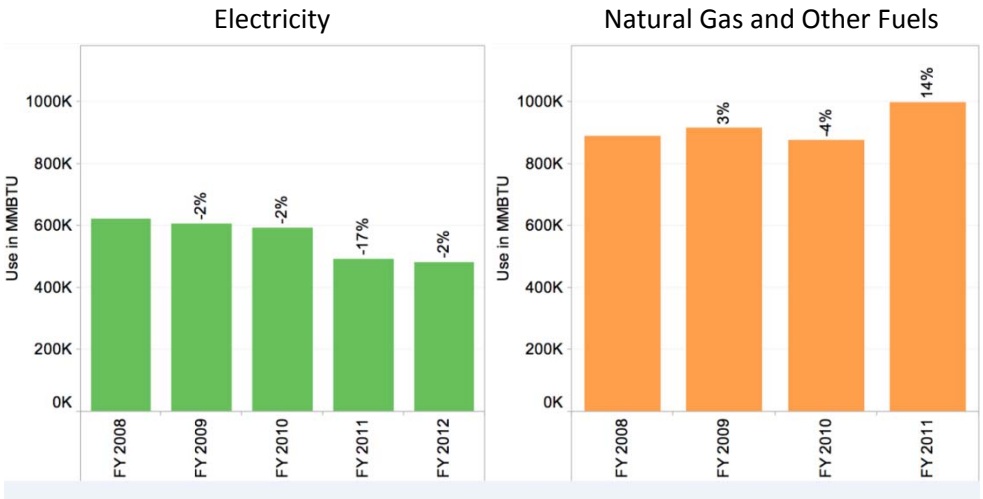


Figure C-8: Cumulative Municipal Electricity Savings

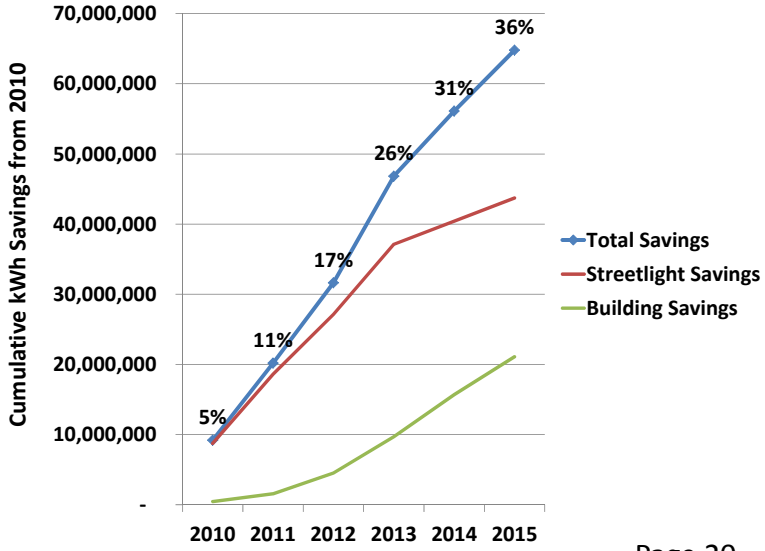


Figure C-7: Municipal Electricity Savings (MWh/year)

	Actual or Estimated Savings			Savings Goals		
	2010	2011	2012	2013	2014	2015
Building Savings	500	1,100	2,900	5,200	6,000	5,400
Streetlight Savings	8,700	9,900	8,500	10,000	3,300	3,300
Total Savings	9,200	11,000	11,400	15,200	9,300	8,700
Building Savings as %	5%	10%	25%	34%	65%	62%

Strategy 2: City-Utility Alignment -- C&I

Initiative 3: Renew Boston Utility Program Manager

In early 2010, NSTAR and the City explored the best ways to coordinate their work on energy efficiency with C&I customers, and later that year NSTAR assigned a Program Manager to work closely with Renew Boston.

1. The Renew Boston Utility Program Manager serves as the single Point of Contact between NSTAR and the City on matters pertaining to individual customers.
    1. The Program Manager is on loan to the City, complete with office space, and email account, business cards.
    2. This work involves frequent contact to assure full communication between these two large organizations, as well as participation in key contacts between large energy users and their utility Account Executives.
    3. The Program Manager has also led Initiative 7 to engage to enlist C&I energy savings leaders as Pacesetters to set an example for other C&I customers in the City.
    4. Roughly half of the Program Manager's time is devoted to working with the Municipal Energy Unit to find efficiency opportunities and deploy NSTAR resources to implement energy savings projects and plans.

The Renew Boston C&I Working Group creates the opportunity and the team to coordinate C&I activity and tracking in Boston, and to develop innovations to continue increasing C&I savings.

Initiative 4: Renew Boston C&I Working Group

The Work Group will continue to meet on a regular schedule under the direction of the Strategy Board.

Tasks to be addressed in 2013 will include:	Initiative
C&I Data and Reporting Protocols. Agree on protocols and templates for C&I data exchange and reporting between City and utilities, including 2012 update of data summarized in Figures 53-55, including synchronization of sectors and segments between utilities.	1
Strategy Board Presentations. Prepare a 2012 Results briefing document for Strategy Board meeting in Spring 2013 with: • citywide savings and energy use metrics through 2012 for all sectors, • a breakdown for the targeted C&I sectors, • a summary of Pacesetter pledges and energy use reductions, and • any recommendations to the Strategy Board. The Renew Boston Office will provide findings to incorporate into the Results document on savings and energy use by City accounts and buildings, and on the extent to which additional savings are needed to meet Renew Boston's 2014 targets to be on track to meet the Mayor's 2020 goal.	1
Small Business Outreach. Oversee results of ongoing "Main Streets" and "Back Streets" small C&I Direct Install program in Boston on a quarterly basis, including reports on remaining opportunities, and recommend next several neighborhoods or other targets for outreach with DND support. Identify ways, when the Direct Install Contractor, RISE, is serving a commercial customer in a multi-tenant building, to increase participation of building owners and other tenants, in order to treat the building with all measures and technologies that would increase energy savings throughout the structure.	5
Pacesetter Initiative. Coordinate with the Renew Boston Utility Program Manager on work with Pacesetters (described below) to accelerate their goal-setting and reporting, and to identify ways in which they could enlist other C&I customers with substantial savings opportunities, including case studies.	7

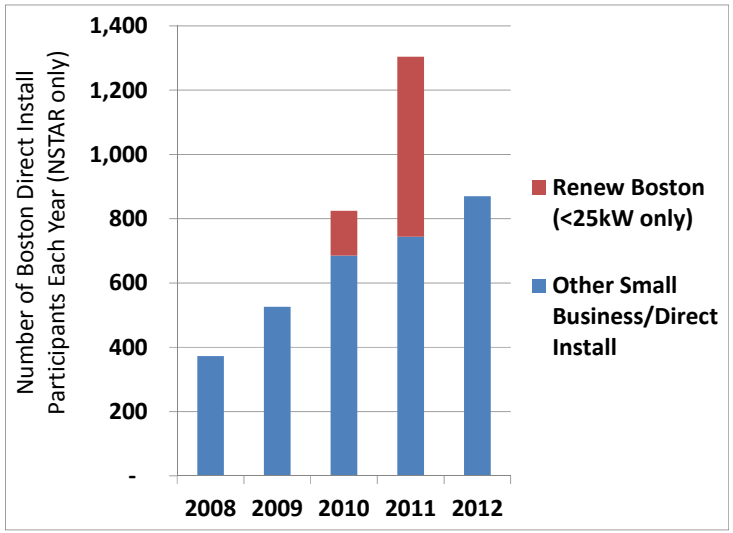
	Initiative
GRC Sector Working Groups. Discuss progress and identify opportunities to recommend activities to the Sector Working Groups. Develop ways to support participating C&I customers to provide energy use data for the use of the Working Groups and Renew Boston.	8
Building Energy Disclosure Ordinance. Develop and oversee implementation of methods to input energy use data into Portfolio Manager or to aggregate energy use data to the building level for building owners and managers to report to the City. Identify ways to integrate or compare sector and building data to develop coherent metrics of C&I progress toward the City's annual energy use targets.	9
District Energy Planning. Identify additional C&I customers in the Innovation District and New Market district to engage in district-level energy planning and investment in energy savings. Coordinate with NSTAR Distribution Planning and Grid Modernization experts to assess grid improvement opportunities in these two districts and their potential for reductions in energy use.	10
CHP. Develop a Boston CHP candidate list and plan a campaign to approach the most promising candidates during 2013 and 2014.	10
Financing. Assess the extent to which existing financing sources and arrangements will continue to be adequate to support deeper C&I energy efficiency and energy generation projects. Coordinate discussions of the prospects for commercial PACE financing.	4, 6, 9

The Renew Boston Small Business Initiative, with EECBG funding, saved 3.3 GWh/year (worth almost $500,000), and in 2011 alone increased participation in the Direct Install program by 75%.

Initiative 5: Small Business

- Renew Boston will continue to increase penetration and savings among the City's small business constituents by building on the success of the EECBG-funded campaign.
  - Over a 12-month period in 2010, DND and RISE reached and served over 700 very small businesses with 25 kW or less in electric demand, saving:
    - 986 kW
    - 3,339,000 kWh and
    - 83,504 therms.
  - This was a significant increase in savings and also a 75% one-time increase in the number of businesses served in 2011 through the Direct Install program, as shown in the bar chart below.

Figure C-9



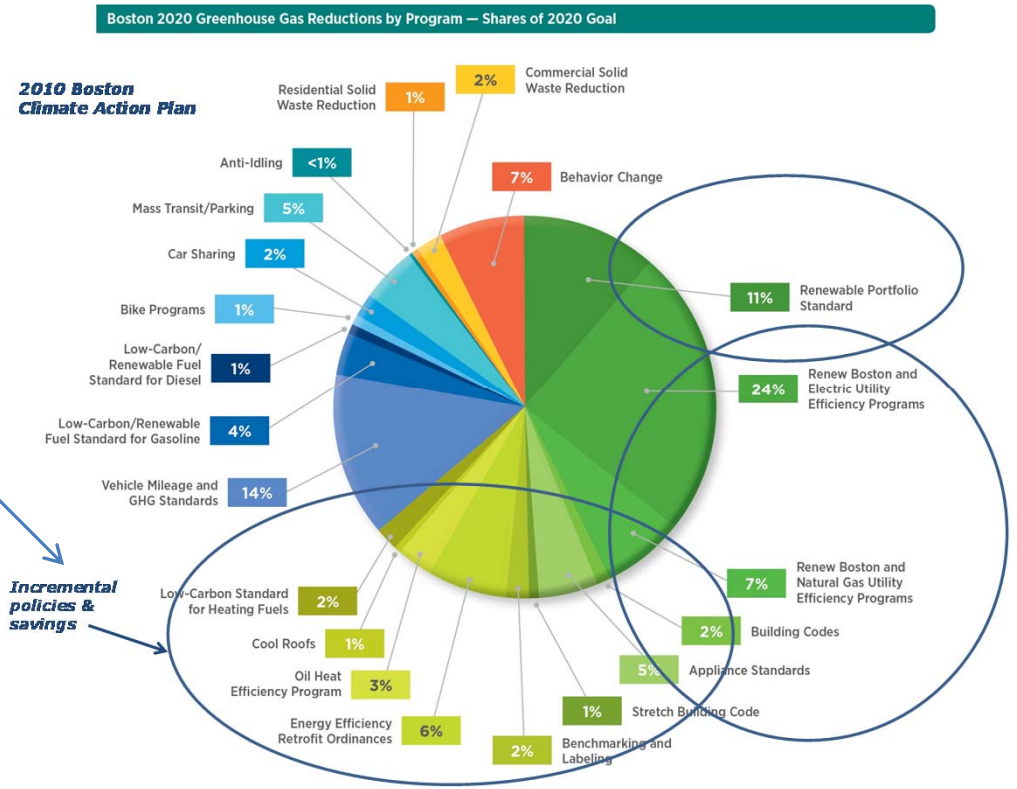
- The Renew Boston Office will be working with ABC (A Better City) in the context of the GRC Working Group for Commercial Real Estate, and will use this opportunity to continue coordinating with ABC and DND on their work to extend the ABC Challenge for Sustainability to additional small businesses.
- Each quarter, the Renew Boston Office plans to work with DND to select 2 new neighborhoods to which outreach will be extended to encourage small businesses to take full advantage of the existing utility Direct Install program. In each case, DND will engage businesses which have already saved substantial energy (based on the RISE reports from the previous outreach to each neighborhood in 2010 and 2011) in order to highlight those savings (further documented with actual energy use data) as part of the "pitch" to new customers.
- Renew Boston will also work with the utilities through the C&I Working Group to identify ways, when the Direct Install Contractor, RISE, is serving a commercial customer in a multi-tenant building, to increase participation of building owners and other tenants, in order to treat the whole building with all measures and technologies that would increase energy savings throughout the structure.

Renew Boston
Save Energy, Save Money
Thomas M. Menino, Mayor

Initiative 6: <u>Green Ribbon Commission & Climate Action Plan</u>

- Renew Boston will continue to share information with the GRC on the level of savings and GHG emission reductions achieved each year in the C&I sectors highlighted by the Commission, for City government, and for Boston as a whole.
- Renew Boston will work with the City's Air Pollution Control Commission to support the development of the 2014 update to the Mayor's Climate Action Plan (CAP). This will include further development of the policies that are incremental to the existing utility and Renew Boston programs; these incremental policies are identified in Figure C-10 by the lower right circle, and are included in Strategy 4 of this Plan.
- By engaging executives of the largest energy users and other influential organizations in the City, the GRC can provide critical credibility for all of Renew Boston's activities. It is essential for the success of Renew Boston's multiple campaign activities to enlist an increasing number of Boston energy users in saving energy that everyone understand the linkage between energy use and global warming.

Figure C-10



Initiative 7: Pacesetters

- The Pacesetter Initiative was developed by the Renew Boston Strategy Board during 2011 to enlist energy savings leaders to set an example for other C&I customers in the City. During 2012, 20 of Boston's largest and most influential energy customers signed a Letter of Intent.
- The Pacesetter Initiative is part of Strategy 3 because it has been developed jointly by the City and the utilities, and it is Boston-specific. (It may be adopted by or extended to other cities over time.) It also illustrates the City's role as a catalyst to help reach more customers and achieve more savings.
- Five of the Pacesetters also have a utility Memorandum of Understanding (MOU) with multi-year energy efficiency commitments. Several others are good candidates for MOUs and most of these are moving forward to work on MOUs with their utilities.
- Once Pacesetters have begun to set public goals and to achieve results, Renew Boston plans to ask interested Pacesetters to get involved in outreach to other customers, and may work with the utilities to distribute case studies.

Renew Boston Pacesetter Letter of Intent

Organization: _____

As an executive of the above-named organization, I join with Mayor Thomas M. Menino in a commitment to meet the energy use reduction goals of the Renew Boston program and the City of Boston Climate Action Plan: a reduction of at least 25% by 2020. It is the goal of my firm/organization to reduce energy costs substantially by taking advantage of the commitment of NSTAR and National Grid to facilitate the participation of Boston businesses and institutions in all available energy efficiency assistance and incentive programs. As applicable, we will work with our property managers, tenants, engineers and other partners to adopt these commitments. As Renew Boston Pacesetters, we will take the following steps:

1. Commit to Executive Involvement. We will engage our organization's financial and operational executives to work with the utility companies, and Renew Boston, setting energy efficiency investment criteria that are appropriate to our business circumstances and goals.
2. Set Goals. We will set quantitative goals for energy use reductions by 2020 and particular interim years, measurable in kWh, therms or BTU, and we will publicize our goals jointly with Renew Boston.
3. Assess Potential Savings from Energy Efficiency. We will work with National Grid and NSTAR and authorized vendors and contractors to complete the no-cost energy audits or whole building assessments offered by the utility companies for our size of facility and type of energy opportunities. We will also consider paying for up to half of a more detailed feasibility study (generally up to $10,000) in return for matching funding from NSTAR, National Grid or sources identified by Renew Boston.
4. Agree on Multi-Year Road Map of Energy Savings. We will develop a "road map" or other document identifying the level of reduction our organization can commit to make in its energy usage within the City of Boston and identifying a package of rebates and other financial and technical assistance. If savings are sufficient, this could take the form of a Memorandum of Understanding with NSTAR or National Grid setting explicit goals for energy use reductions and listing energy efficiency investments to be implemented over a period of at least three years.
5. Invest in Attractive Energy Efficiency Opportunities. We will make Investments in energy saving or clean energy measures co-funded with rebates and incentives through appropriate gas and electric utility and state programs.
6. Track Energy Savings. We will provide quarterly data on our consumption of electricity, natural gas and other energy (i.e., oil, steam, electricity and thermal energy from CHP and district energy systems) to Renew Boston (directly or through Portfolio Manager), and we will authorize all our utility and energy companies to provide data on our facilities' energy savings and energy use to Renew Boston, for the purpose of tracking greenhouse gas reductions over time.

Signature & Date: _____

Name & Position: _____

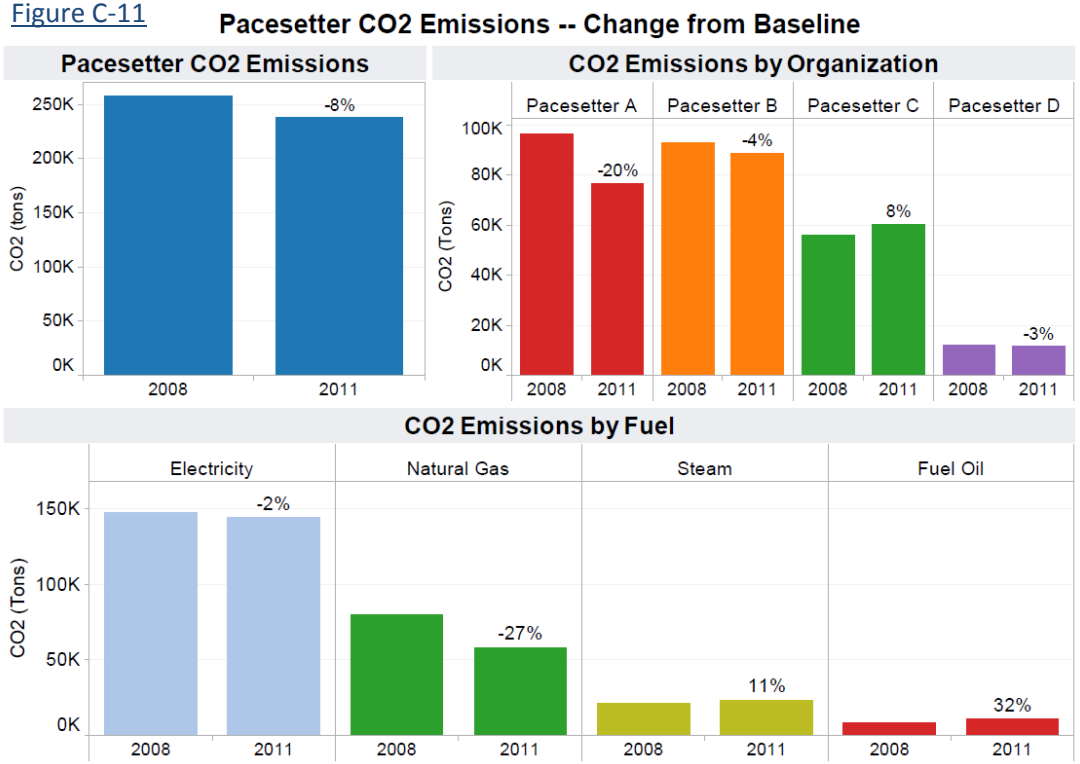
Manager with responsibility for follow-up: _____

Renew Boston December 2011

Initiative: Pacesetters (continued)

- The Pacesetter Initiative is based primarily on reporting progress toward goals, but it is not enough to report the number of Pacesetters.
- Individual Pacesetters are now assembling and submitting their energy use data to Renew Boston. For example, data on 4 Pacesetters are presented in the accompanying charts. During 2013 this kind of data should become available from most of the 20 Pacesetters.
- An important step for each Pacesetter will be to set energy use targets or "pledges" for 2020 and/or interim year(s). Once these goals have been set, the reporting of actual energy use and reductions will be reported against these pledges using a dashboard framework discussed with the Strategy Board, which will also be considering approaches to "publicize" these goals and results.

Figure C-11



Strategy 4: C&I Greenovation Lab

Initiative 8: GRC Sector Working Groups

1. The Green Ribbon Commission has organized three Sector Working Groups consisting of GRC members and other Boston major energy users in each sector:
    - Commercial Real Estate
    - Health Care
    - Higher Education.
2. The Barr Foundation has provided funding for non-profit organizations to organize and support the work of these three Working Groups.
3. The Renew Boston Office has begun to facilitate regular meetings with each Working Group, some of which include the utilities, in order to ensure coordination among the multiple organizations engaged in energy efficiency work in Boston, as well as to support actions to increase energy efficiency in each sector.
4. The engagement of the largest energy users in the City at the senior management level, and building peer relationships within each sector, is intended to substantially increase the energy savings and GHG reductions at the participating organizations.
    - The Working Groups will provide a means to reach out to other energy users within each sector.
5. As stated above, the Renew Boston approach is to honor the special relationship of each utility with its large customers. At the same time, it is recognized that these energy users are constituents of the City, as are the trade associations and nonprofits that represent them. Therefore, Renew Boston is in a good position to help these stakeholders and the utilities improve alignment and thereby achieve and accelerate the greatest energy savings.

Initiative 8: <u>GRC Sector Working Groups (continued)</u>

5. The Renew Boston office plans to work with each Sector Working Group to increase the information available in the next few years about energy use and resulting GHG emissions for the Working Group members and within each sector as a whole, beginning with baseline data for the appropriate year(s) in the 2008-2012 time frame.
    - This will include data from the Building Energy Disclosure Ordinance, which is described under Initiative 9 below, to the extent that the contribution of each sector to the usage of each individual building can be identified.
    - Each Sector Working Group will work with its members and other significant energy users within the sector to develop data exchange protocols or systems to track energy use for the sector within Boston and report this information to Renew Boston.
    - This information will be combined with utility and other data to assess the extent to which the City is on track to reduce energy consumption sufficiently to meet the Mayor's 2020 climate goal, as described in Section 2 of this Plan.

Initiative 9: <u>Building Energy Disclosure Ordinance</u>

- The Office of Environmental and Energy Services (EES) is currently drafting an ordinance to be submitted to the City Council that in part will include:
  - The City leading by example by annually disclosing energy and water use in all its facilities.
  - All large and medium buildings would be required to report annual energy and water use through Portfolio Manager or an equivalent mechanism as approved by the Air Pollution Control Commission.
  - The City would make energy and water use per square foot, Energy Star ratings, greenhouse gas emissions, and other identifying and contextual information for individual buildings available on the Internet.
- The establishment of this requirement would "provide information to owners, residents, and prospective buyers and tenants, and, through education and the operations of the market, create incentives to participate in energy efficiency programs."
- Many of the actions building owners and managers can take would feature behavioral campaigns with savings that will be above and beyond those already targeted by utility efficiency programs, achieving incremental savings.
- In 2010, the Mayor's Climate Action Leadership Committee recommended an energy disclosure requirement for Boston buildings by 2012.
- Other cities already have such ordinances (including New York, Philadelphia, Seattle, San Francisco).
- The requirement would apply to the following:
  - In 2013, City buildings;
  - In 2014, approximately 800 non-residential buildings greater than 50,000 square feet;
  - In 2015, approximately 200 residential apartment and condo buildings with more than 40 units ;
  - In 2016, approximately 1,500 non-residential buildings with 20,000 – 50,000 square feet;
  - In 2017, approximately 300-400 residential buildings with 21-40 units.
- The City expects that building owners will focus on their building's data before they are required to report it, and that savings will begin in 2013 and 2014 and will then continue to increase.

Initiative 9: Building Energy Disclosure Ordinance (continued)

- Until the Disclosure Ordinance, Renew Boston has been targeting large C&I energy users by sector and by district. Other than through the Pacesetter Initiative, Renew Boston has not been targeting individual customers, but has been relying on the utilities to target individual customers and work with them through the utility Account Executives.
  - Since many of the largest electricity users are in the Health Care and Higher Education sectors, as shown in Figure C-12 below, they are already being targeted by Renew Boston indirectly through the sector-based initiatives.
  - Many of the other large users below, such as those in the Financial sector, will be submitting energy use information through the Ordinance.

Figure C-12, Largest Electricity Customers (Phase 1 Report)

		Number of Customers
1	Real Estate	58
2	Hospital	28
3	University	27
4	Government	20
5	Financial	11
6	Communications	11
7	Hotel	13
8	Industrial	4
9	Boston (incl. BHA)	9
10	Sports, Assembly	6
		187

Figure C-13

Building Segment	Current Estimated Energy Usage (kWh)	Estimated Current Level of Efficiency (kWh/sq. foot)
Sample Buildings	279,710,327	20.1
Top 55	779,754,839	22.2
All Class A	1,040,614,886	22.9

- The Ordinance represents a step toward more focused targeting by Renew Boston. It will identify most of the buildings which use most of the energy in the City.
  - Figure C-13 above estimates that 779,000 MWh is used by the top 55 commercial office buildings that were studied by Waypoint, which is 75% of the electricity used by Class A buildings, and is most of the electricity for Commercial Real Estate tabulated in Figures C-1 and C-2 under C&I Initiative 1.
- Figure C-14 below indicates that most or all of the Class A buildings will be required to submit their data in the first tranche, for 2014 energy use.
- The Ordinance can be expected to cause building owners and managers and major tenants to set business goals to reduce their energy use. As documented by the Waypoint study, this is not happening widely at present:
  - "More than half of the buildings stated they had goals and targets (57%). However, upon further inquiry, it was discovered that these goals and targets were general in nature, did not have numerical targets associated with them and had few goal related M&V processes in place."

Figure C-14, Largest Office Buildings

	Number of Buildings	% of Number of Buildings	Total Building Area (MSF)	% of SF	Average Building Size (SF)
Class A	152	13%	53.73	56%	353,456
Class B	547	47%	30.23	32%	55,271
Class C	466	40%	11.87	12%	25,438

Initiative 10: <u>District Energy Planning, CHP and Financing</u>

- As stated above, in addition to targeting C&I sectors, Renew Boston has been targeting C&I energy users by <u>district</u>. The first two Energy or Eco-Districts have been:
  - Innovation District, including the Boston Marine Industrial Park (BMIP), and
  - New Market.
- In 2013, Renew Boston will consolidate the various activities in these two Energy Districts, and then Renew Boston plans to seek funding to develop formal Plans for 2030 energy use and energy systems for the first two districts, through a process during 2013 and 2014 in which the largest energy users will be invited to participate.
  - If the City decides to develop a city-wide Energy Plan, the district planning work will be coordinated or folded into the development of the city-wide Energy Plan.
- Renew Boston will also develop a plan to expand districts by selecting additional areas with significant energy use, opportunities for clean energy generation and other characteristics for a successful Energy District.
- This work in each district will include an evaluation of opportunities for development of CHP and district energy systems.
  - Renew Boston will work with the utilities through the C&I Working Group to develop a CHP candidate list in these districts and city-wide, and to plan a campaign to approach the most promising candidates.
  - BIDFA financing will be one of the types of assistance that Renew Boston will offer to CHP candidates.
  - Renew Boston will work closely with the owners and managers (and customers) of the City's existing district energy systems to identify opportunities for expansion, modernization and climate mitigation.
- As part of this Initiative, Renew Boston will continue assessing the prospects for commercial PACE (Property-Assessed Clean Energy) Financing to support deeper C&I energy efficiency and energy generation projects.
  - Commercial PACE may require sufficient energy projects to support a significant scale of capital financing in order to be feasible. Therefore, the energy planning work at the district and city-wide levels will include assessment of potential PACE implementation options.

Contents of Section 5

Strategy 1: Tracking of Progress and Strategy

Initiative 1: Targeting through Data Mining

- Renew Boston is working with the utilities and other Partners to target outreach to types of buildings and to particular building owners, where the greatest energy savings can be expected and also where assistance may be most needed.
- Data mining is a key part of this targeting work, and is using data from the City of Boston data and the utilities.
- The following building characteristics are being used for this data mining to target one to three-family homes:
  - Number of dwelling units
  - Owner occupancy
  - Age of building
  - Exterior finish
  - Roof type.

Figure R-1 **Residential Property -- Square Footage by Parcel Type**

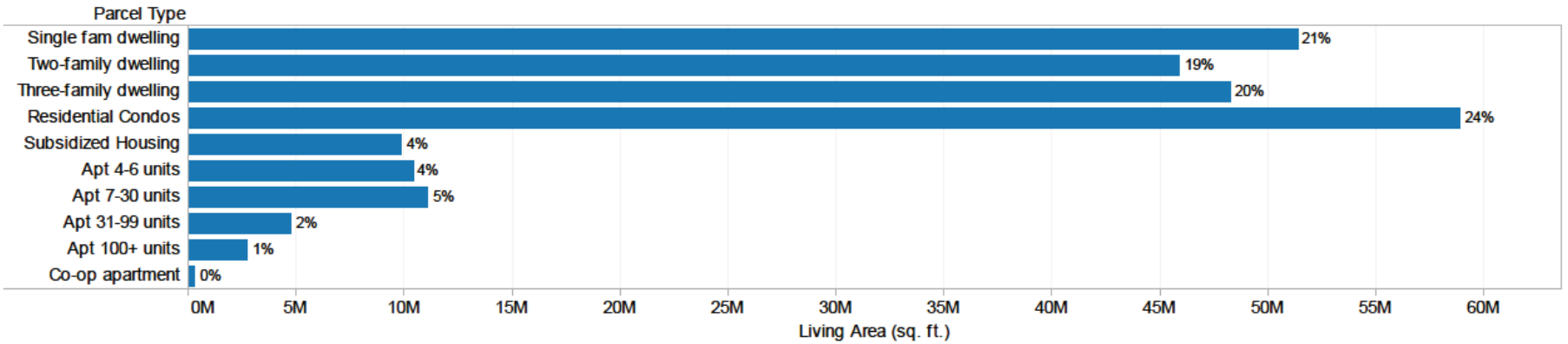


Figure R-2 **Residential Property by Parcel Type**

Parcel Type	No. of Parcels	Living Area (sq. ft.)	% of Total Living Area	Avg. Assessed Value	Avg. Assessed Value / sq. ft.
Single fam dwelling	30,477	51,403,442	21%	$233,609	$139
Two-family dwelling	17,604	45,940,718	19%	$240,077	$92
Three-family dwelling	13,929	48,287,468	20%	$270,967	$78

Initiative 1: Targeting (continued)

- The City has multiple databases and systems from which data could be drawn. The data for this targeting exercise was taken from the Assessing Parcel Database.

Figure R-3 City of Boston Data Sources

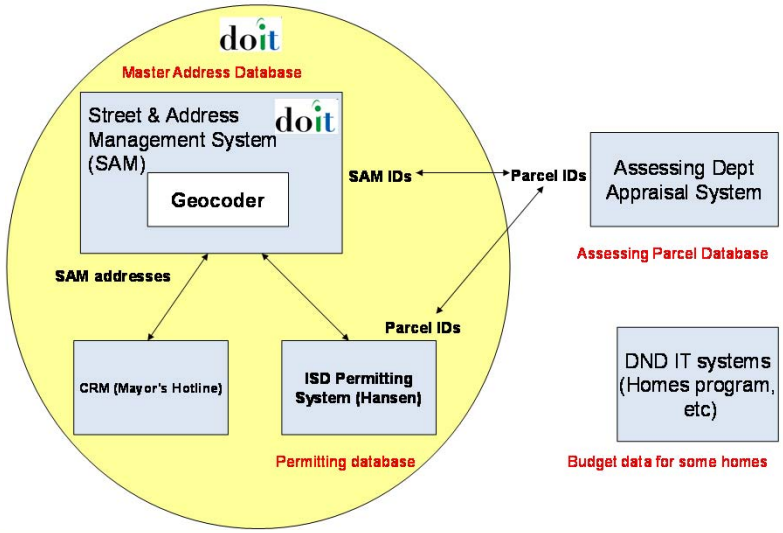


Figure R-4 Owner Occupancy by Parcel Type

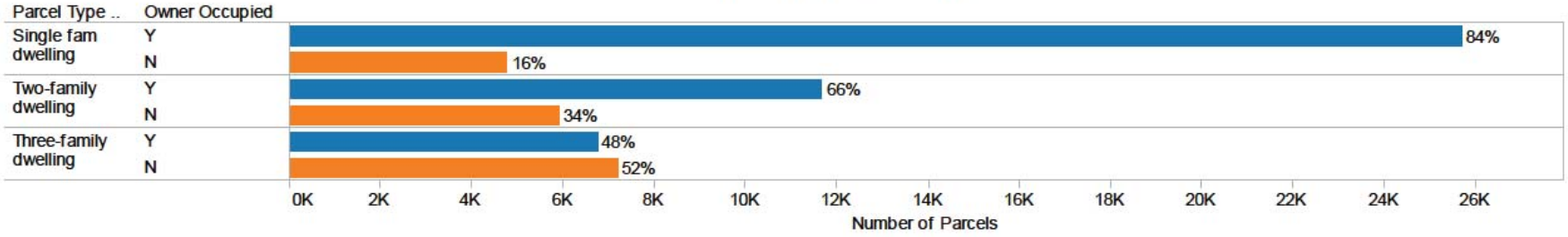


Figure R-5 1 - 3 Unit Homes -- Owner Occupancy

Parcel Type Description	Owner Occupied	Utility Cust. (est.)	No. of Parcels	Living Area (sq. ft.)	% of Living Area	Avg. Assessed Value	Avg. Assessed Value / sq. ft.
Single fam dwelling	Y	25,705	25,705	43,151,789	84%	$229,550	$137
	N	4,772	4,772	8,251,653	16%	$255,473	$148
Two-family dwelling	Y	23,370	11,685	30,863,859	67%	$240,875	$91
	N	11,838	5,919	15,076,859	33%	$238,501	$94
Three-family dwelling	Y	20,244	6,748	23,949,060	50%	$269,039	$76
	N	21,543	7,181	24,338,408	50%	$272,778	$80
Grand Total		107,472	62,010	145,631,628	100%	$243,836	$104

Initiative 1: Targeting (continued)

- The Boston Assessing building database can provide helpful information for targeting outreach, especially when geo-coded. A Renew Boston dashboard (on the right) can be used to zoom into any area of Boston to locate neighborhoods with significant numbers of two and three-family homes built in any target period.

Figure R-6

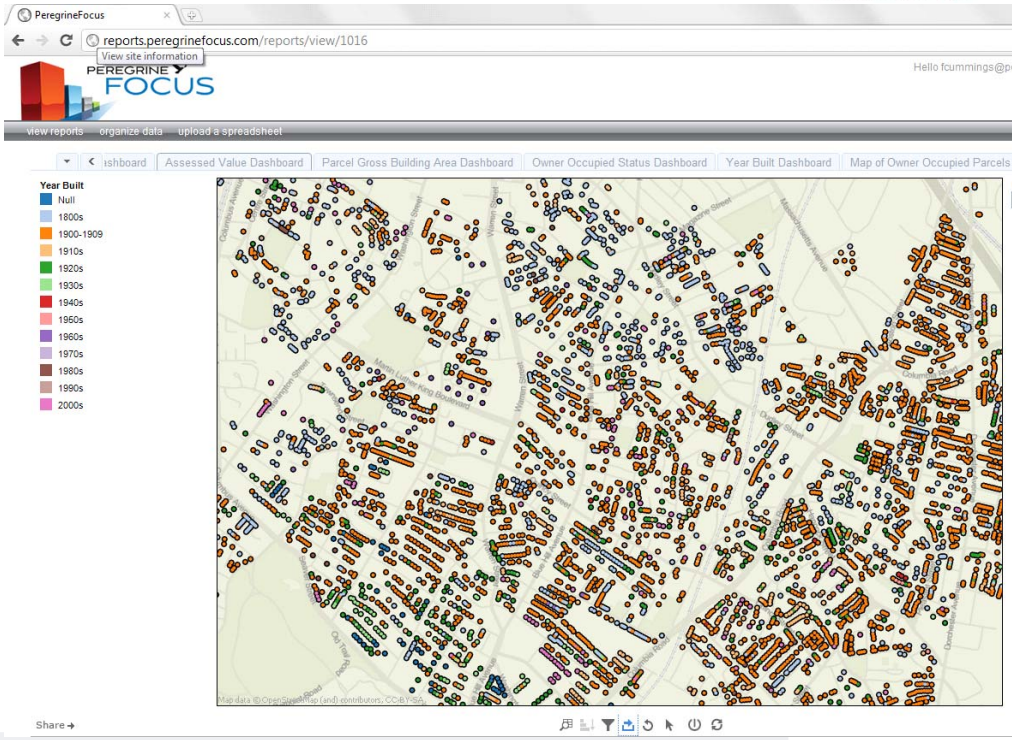
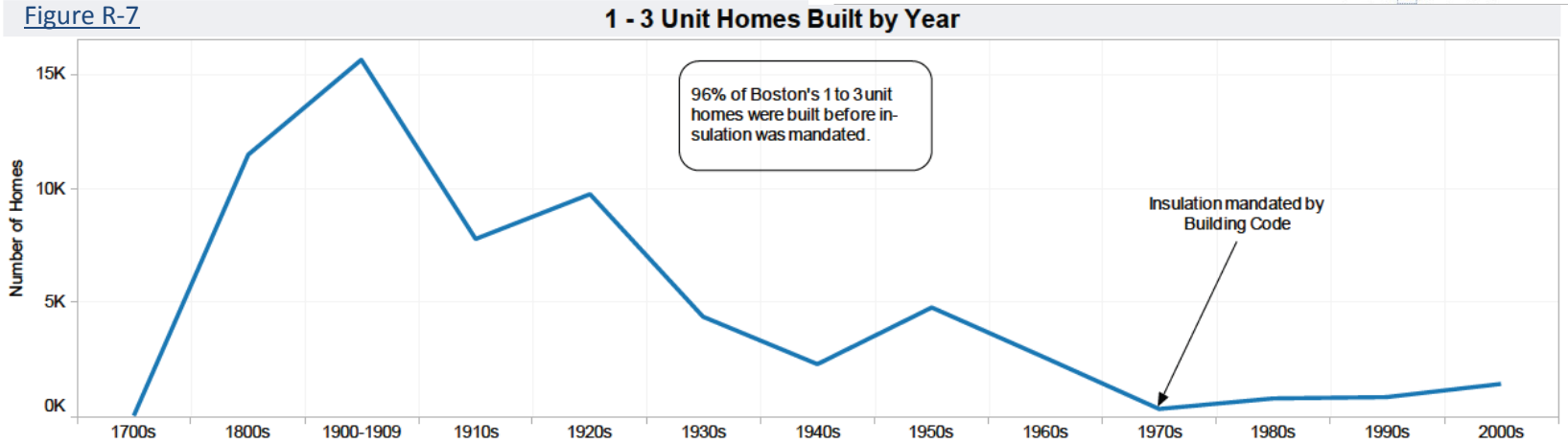


Figure R-7



Additional Targeting Screens for One-Three Family Homes

Figure R-8

Exterior Finish

External Finish	No. of Parcels	Living Area (sq. ft.)	% of Total Living Area	Avg. Assessed Value	Avg. Assessed Value / sq. ft.
Aluminum/..	31,492	71,173,621	49%	$198,748	$88
Wood Sha..	13,598	30,354,204	21%	$226,891	$102
Brick/Stone	5,484	15,490,976	11%	$579,051	$205
Frame/Cla..	5,154	12,660,023	9%	$270,069	$110
Asbestos	4,056	10,054,506	7%	$179,746	$73
Asphalt Pit..	1,395	3,920,156	3%	$182,685	$65
Stucco	680	1,704,846	1%	$285,084	$114
Veneer	126	225,383	0%	$201,428	$113
Others	25	47,913	0%	$218,638	$114
Grand Tot..	62,010	145,631,628	100%	$243,836	$104

Figure R-9

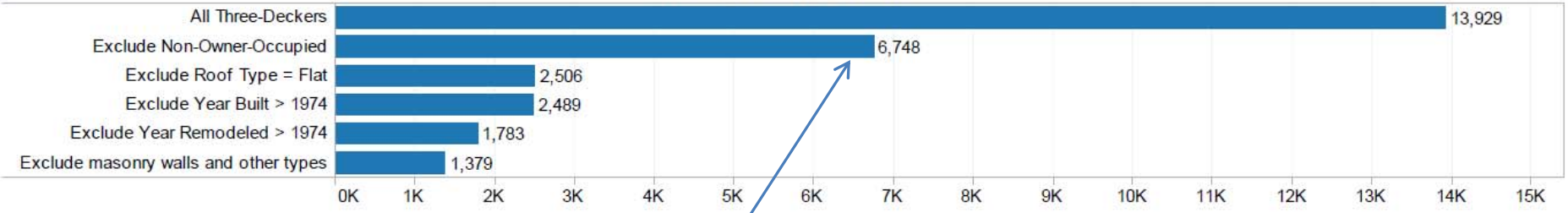
Roof Type

Roof Type	No. of Parcels	Living Area (sq. ft.)	% of Total Living Area	Avg. Assessed Value	Avg. Assessed Value / sq. ft.
Gable	34,173	68,819,561	47%	$212,956	$106
Flat	12,319	38,440,632	26%	$278,957	$89
Hip	10,214	25,268,377	17%	$232,455	$94
Mansard	3,266	8,779,511	6%	$478,582	$178
Gambrel	1,759	3,833,835	3%	$233,293	$107
Shed	275	481,727	0%	$207,274	$118
O	4	7,985	0%	$444,950	$223
Grand Tot..	62,010	145,631,628	100%	$243,836	$104

Initiative 1: Targeting (continued)

- Renew Boston's original targeting work in 2009 resulted in the following recommendation in the March 2010 Phase 1 Report:
  - Recommendation 3: Select Initial outreach priorities both to meet the greatest economic needs and to achieve city-wide energy savings goals.
  - As stated in the Report, "For the residential sector, the following initial outreach targets were developed and approved through the first two Renew Boston Advisory Committee meetings in November and January:"
    - "One to four-family rental properties with tenants who have incomes between 60 and 120% of the median,
    - Three-Deckers."
  - "Additional sectors and types of constituents should be added to the outreach campaign over time as resources permit."
- During 2012, one targeting exercise was conducted to test the identification of particular three-deckers expected to be promising for energy savings, using only the building data presented in the preceding Figures. The result, presented on the next page in Figure R-10, "Three-Decker Screens", was a set of 1,379 three-deckers – about 10% of the total three-decker stock in the City.
  - Some of these targets have likely been touched already by the Renew Boston campaign. An Assessment was done for at least one unit in 1,271 three-family buildings (not limited to true three-deckers), among participants who signed up for Renew Boston from January 2011 through August 2012, as illustrated in Figure R-19 under Initiative 2.

Figure R-10



- The building screens were applied sequentially for this targeting exercise, as shown above:
  - The first screen set aside the 52% of the three-deckers with absentee landlords, which could be targeted separately but for this exercise are assumed to be more difficult to serve.
  - The second screen set aside flat roofs. The challenge of insulating flat roofs is addressed by Residential Initiative 7, "Three-Decker Attic Insulation," but Mass Save is not currently allowing attics to be insulated under flat roofs due to concerns about moisture and ventilation.
  - The next two screens set aside buildings built or remodeled since 1974, since codes required significant insulation after that.
  - The last screen excluded a few building types that are more difficult to insulate such as row houses and those with masonry walls.
  - The resulting 1,379 buildings are distributed among neighborhoods as shown in Figure R-11 to the right.

Figure R-11

Targeted Three-Deckers by Neighborhood

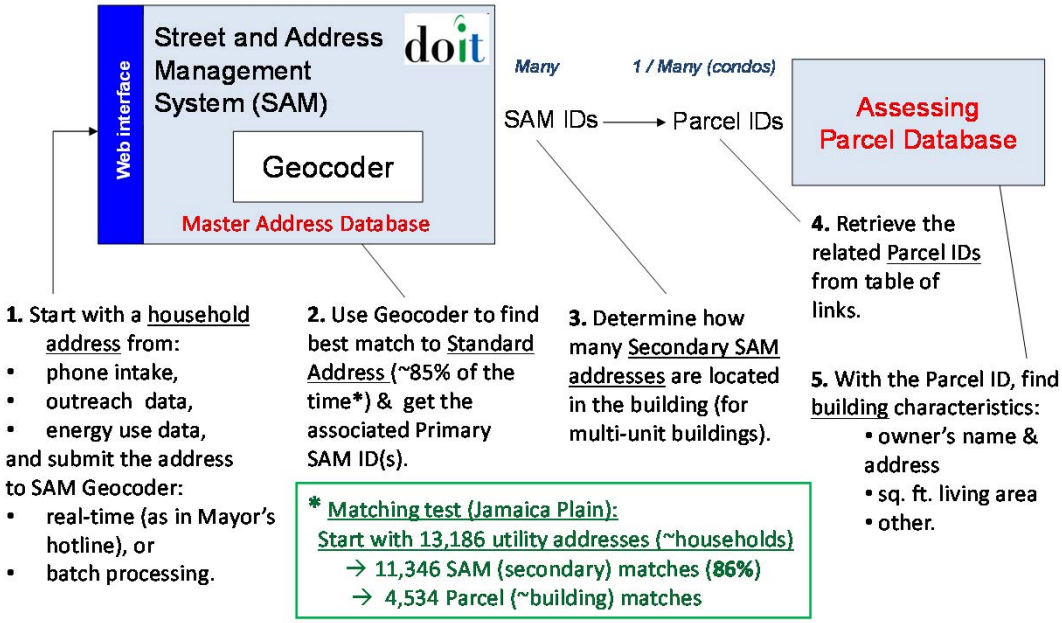
Neighborhood	No. of Parcels	Living Area (sq. ft.)	Avg. Assessed Value
Allston	23	81,989	420,961
Brighton	53	174,808	372,469
Charlestown	3	7,484	196,767
Dorchester/Codman Square	221	802,080	212,618
Dorchester/Fields Corner	63	221,642	219,146
Dorchester/Uphams Corner	149	533,019	223,951
East Boston	89	267,017	186,274
Hyde Park	65	219,258	225,708
Jamaica Plain	181	657,965	380,131
Mattapan	68	242,354	194,145
Roslindale	96	302,282	266,384
Roxbury	66	236,293	194,522
Roxbury Crossing	27	110,040	497,607
RoxburyRoxbury/Grove Hall	211	821,129	181,578
South Boston	41	126,012	322,380
West Roxbury	23	71,630	305,752
Grand Total	1,379	4,875,002	252,242

Initiative 1: Targeting (continued)

- The above screening exercise is only one example of an approach to targeting, and the City plans to work with the utilities and other partners to explore and implement additional approaches to support Renew Boston 3.0 (which is described further below under Residential Initiative 4). For example:
  - NSTAR has begun similar targeting exercises using City data plus its own data, including recent participation in efficiency programs.
  - The City plans to work with both utilities to develop an approach in which they will utilize their data on the electricity and gas usage of customers to mine data on building characteristics from the City's databases, using the 5-step process described in Figure R-12 to the right. Energy use data is addressed further under Residential Initiative 8 below.
  - Once an acceptable solution has been developed for Mass Save to insulate and air seal attics under flat roofs, through Initiative 7, Renew Boston will notify owners of such buildings that their attics are now eligible for incentives. Renew Boston will also contact such owners who have already had their walls insulated and air-sealed, but not their attics.
  - In addition to targeting buildings where the greatest energy savings can be expected, Renew Boston will also be targeting homes where assistance may be most needed in order to reduce energy costs and mitigate the health problems associated with leaky houses.

Figure R-12 **Finding Characteristics of Particular Building(s)**

A 5-Step Process

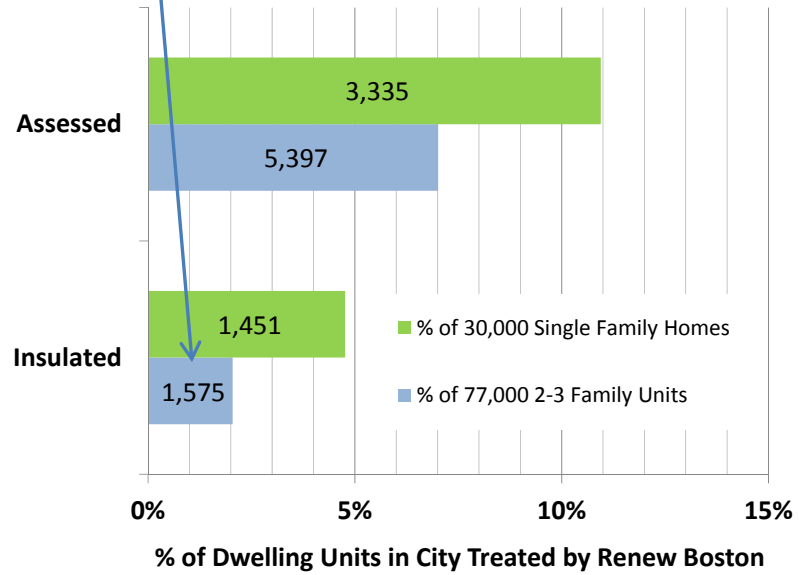


Initiative 2: Neighborhood and Building Tracking

1. Performance to Date. Renew Boston was established as a performance-based approach to use feedback from the field to improve strategy through the Strategy Board. Residential metrics to date are presented in the Appendix, "Residential Participation to Date," including tracking of:
    1. Participation across all efficiency programs
    2. Growth of the Renew Boston outreach campaign
    3. Growth in percent of households participating in Home Energy Assessments
    4. Growth in weatherization
    5. Rates of conversion from prospect to assessment to insulation
    6. Monthly levels of participation in Renew Boston
    7. Participation of tenants and landlords in two to four-family housing.
2. Areas for New Metrics. Initiative 2 calls for a continuation of this kind of tracking of participation, but also for more comparison of results with citywide data on housing stock (point #3 below), and for collection and analysis of additional data, especially more detailed tracking of:
    1. Most active neighborhoods (#4 below)
    2. Treatment of whole buildings (#5 below).

3. City-Wide Penetration. An important dimension of this Initiative is to explicitly compare results with citywide data on housing stock, in order to assess the need for new strategies to reach more buildings across the city. For example, the following chart shows the percentage of housing units that have been served by Renew Boston to date, showing that only 2% of 2-3 family units (numbering 1,575) have been recently insulated and underscoring the need for new Initiatives that are addressed under Initiative 4 below.

Figure R-13



Initiative 2: Tracking (continued)

4. Neighborhoods Most Active in Renew Boston. Renew Boston will continue to track results by neighborhood, and will begin to track results at the sharper level of census tracts or blocks. New strategies will be sought to improve penetration. Results to date include:
   - The monthly intake of prospects has varied by place and time.
   - Many aspects of the Renew Boston outreach campaign are neighborhood-based, so the percentage of households who received an assessment was greater in some neighborhoods – specifically, above 5% in Roslindale and Mattapan, as shown in Figures R-15 and R-16.
   - On the other hand, the weatherization rate is affected by other factors in addition to outreach, but Roslindale still did well on this metric. The neighborhoods are listed in order of the weatherization rate.

Figure R-16

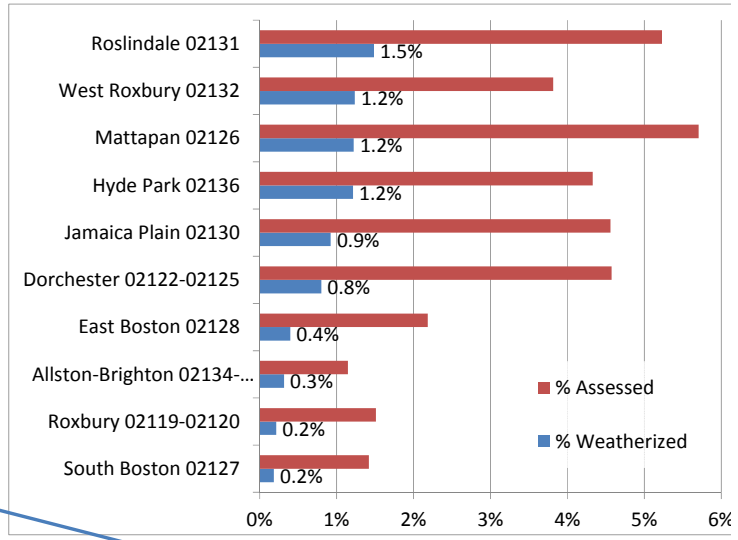


Figure R-14

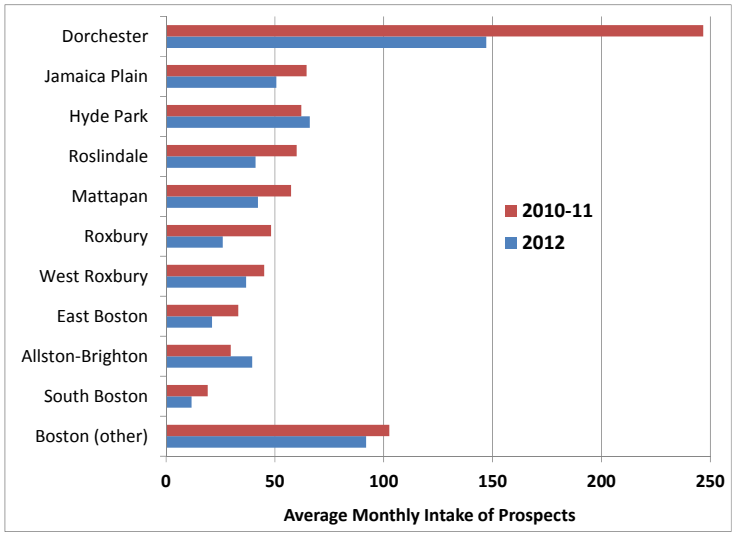


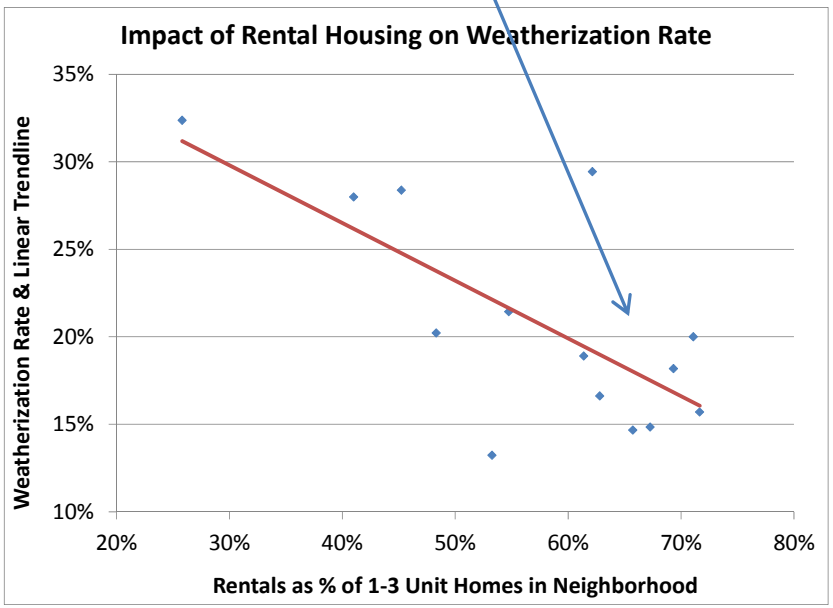
Figure R-15

	1	2	3	4	5	6	7	8
	Residential Electricity Customers	2010 RCS Assessments, Electric Only*	% Assessed	NSL Energy Assessments	% Assessed	WX Contracts Scheduled	Wx Rate*	% Weatherized
Roslindale 02131	11,186	390	3.5%	585	5.2%	166	28%	1.5%
West Roxbury 02132	10,851	430	4.0%	414	3.8%	134	32%	1.2%
Mattapan 02126	9,080	160	1.8%	518	5.7%	111	21%	1.2%
Hyde Park 02136	10,233	250	2.4%	443	4.3%	124	28%	1.2%
Jamaica Plain 02130	14,209	410	2.9%	648	4.6%	131	20%	0.9%
Dorchester 02122-02125	36,336	670	1.8%	1,662	4.6%	291	18%	0.8%
East Boston 02128	13,595	10	0.1%	297	2.2%	54	18%	0.4%
Allston-Brighton 02134-0213	26,896	230	0.9%	308	1.1%	85	28%	0.3%
Roxbury 02119-02120	22,358	110	0.5%	338	1.5%	48	14%	0.2%
South Boston 02127	13,111	10	0.1%	186	1.4%	24	13%	0.2%
Other ZIP Codes	52,145			593	1.1%	103	17%	0.2%
Total	220,000	2,670	1.2%	5,992	2.7%	1,271	21%	0.6%

Initiative 2: Tracking (continued)

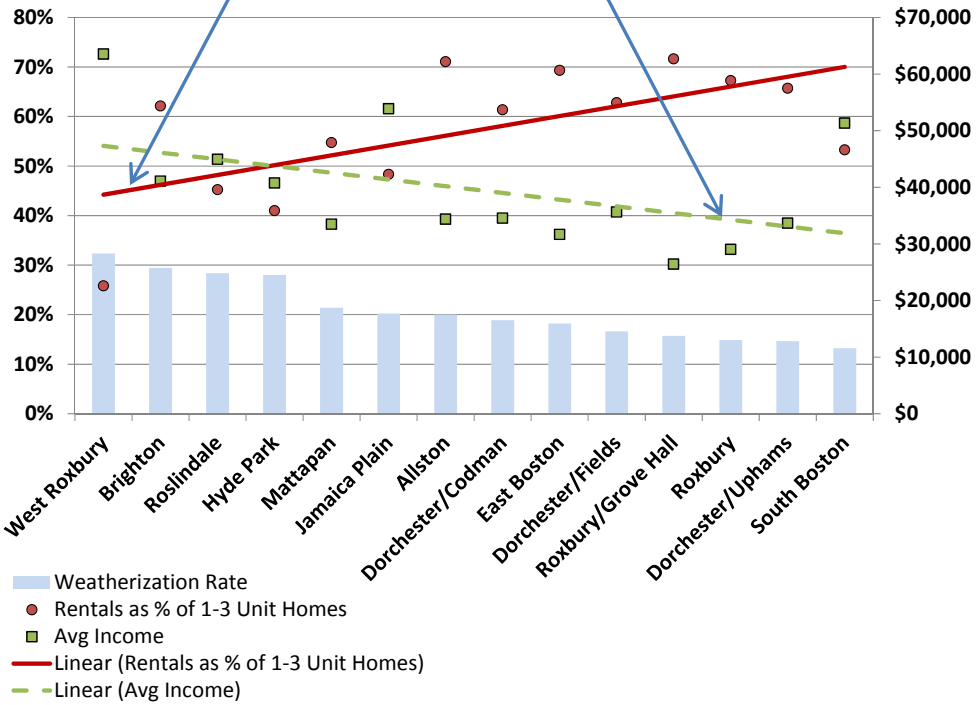
- Two factors that may have an impact on weatherization rates between neighborhoods are the prevalence of rental housing and average household income.
- The chart below shows that the weatherization rate is lower where rentals are a higher percentage of the housing stock.
- The charts on this page are based on weatherization done through 2011.

Figure R-17



- The red line in the chart below confirms that the weatherization rate is lower in specific ZIP codes where there is more rental housing.
- The green dotted line indicates the extent to which the weatherization rate is lower in specific ZIP codes where income levels are also lower.

Figure R-18

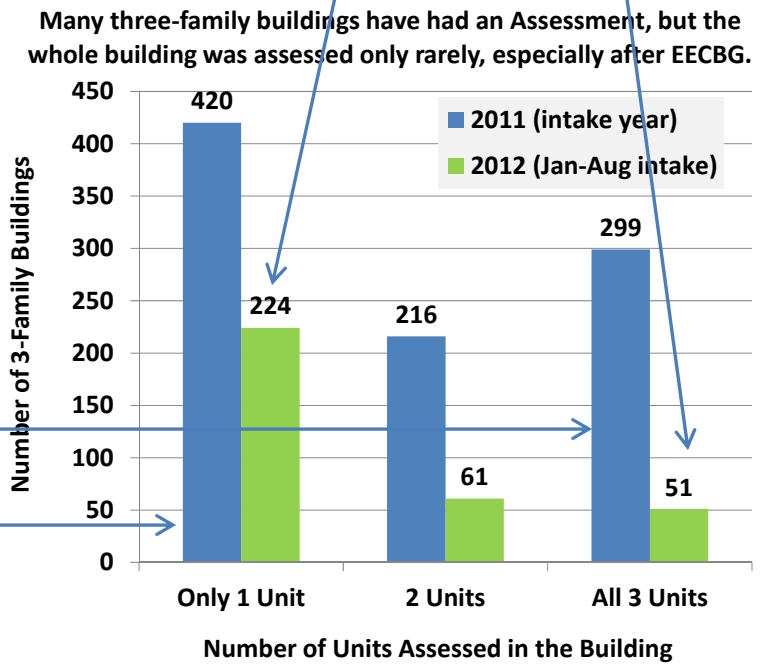


Tracking at the building level reveals that, while at least one Home Energy Assessment was done in over 1,270 three-family buildings, all three units were assessed in only 28% to 32% of these buildings.

Initiative 2: Tracking (continued)

5. Treatment of Whole Buildings. Renew Boston has been monitoring the number of whole residential buildings with 2 to 4 units that have been insulated, with the objective of serving as many tenants as possible, in addition to landlords who live in their buildings. Figure R-21 maps buildings by the number of units weatherized.
   - The EECBG funding and/or funding from Action for Boston Community Development (ABCD) made it possible to eliminate the typical "split incentive" for landlords if all their tenants were income-eligible. ABCD is the local agency in Boston that administers the federal Weatherization Assistance Program (WAP), eligible only to residents within 0-60% median income
   - The good news is that Renew Boston has reached a large number of three-family homes. At least one unit received a Home Energy Assessment in a total of 1,271 three-family buildings (including families who signed up for Renew Boston from January 2011 through August 2012).
   - The bad news is that all 3 units were assessed and weatherized in a relatively small percentage of them, even for those who signed up for Renew Boston in 2011 when the no-cost insulation offer was available for all the apartments:
     - Of the 935 buildings that signed un in 2011 in which an assessment was done, only 299 (32%) had all three assessments.
     - Unfortunately, in 420 three-family buildings (45%), only one unit was assessed (often the one in which the landlord was living).
     - The three-family buildings in which one, two or three units were treated are charted in Figure R-19.
   - After the EECBG funding, that is, for the 336 three-family buildings that signed up beginning in January 2012 in which an assessment was done (shown in the green bars), only 51 (which is a lower percentage of 28%) had all three units assessed, and in 224 of these (51%), only one unit was assessed. (This is not comparable to the 2011 numbers in absolute terms since this information is for a partial year.)

Figure R-19



112 three-family buildings have had all three units weatherized to date, but many more three-families have not been able to do the whole building: in another 186 three-families, only 1 or 2 units were weatherized.

Initiative 2: Tracking (continued)

- A similar pattern was demonstrated for actual insulation work. Figure R-20 shows weatherization activity for the 298 three-family buildings which insulated at least one unit, including those who signed up from September of 2010 through August of 2012, and also including units which were weatherized by ABCD. (This tabulation is not limited to traditional three-deckers.)
  - In 38% of these -- 112 buildings – all three units were weatherized, shown in the right-hand-most bar in the chart. Of these, the Renew Boston contractor, Next Step Living, did the insulation and air sealing work in all three units for 86 buildings, and the rest were weatherized partly or completely by ABCD under the low-income program.
  - Following the pattern set by energy assessments discussed above, in 125 three-family buildings (42%) only one unit was insulated, including 110 done by Renew Boston plus 15 done by ABCD.
  - The numbers of three-family buildings in which one, two or three units were weatherized are charted in Figure R-20 to the right.

- Renew Boston created a Landlord Coordinator position who since August 2011 has been working to coordinate 2-4 family whole-building energy efficiency. This work includes extensive communication and support for landlords and their tenants throughout the assessment and weatherization process, and also extensive coordination with Next Step Living and ABCD. Renew Boston will continue this role for 2013, and will work with the utilities to target this assistance to landlords who will be eligible for the new whole-building incentive.

Figure R-20

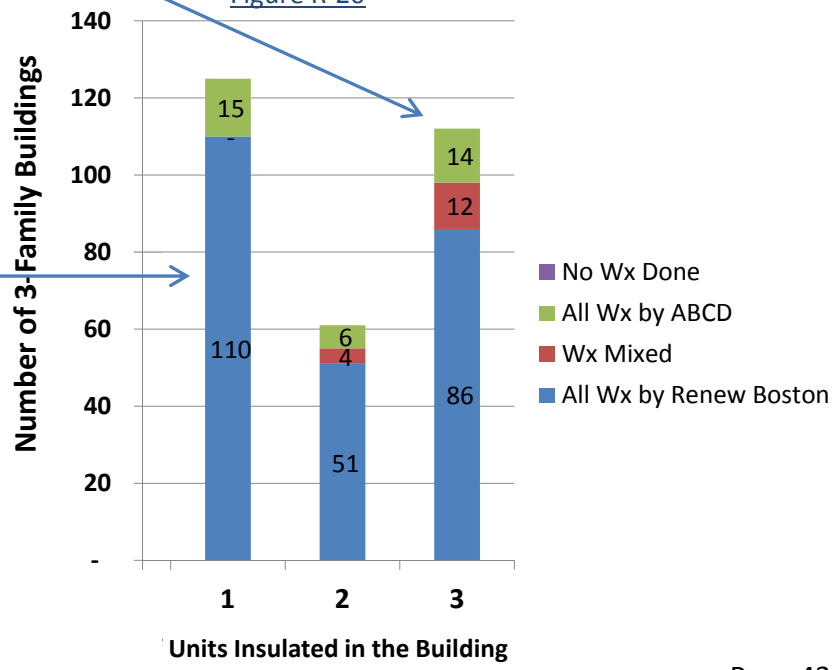


Figure R-21: Participating buildings by number of units insulated

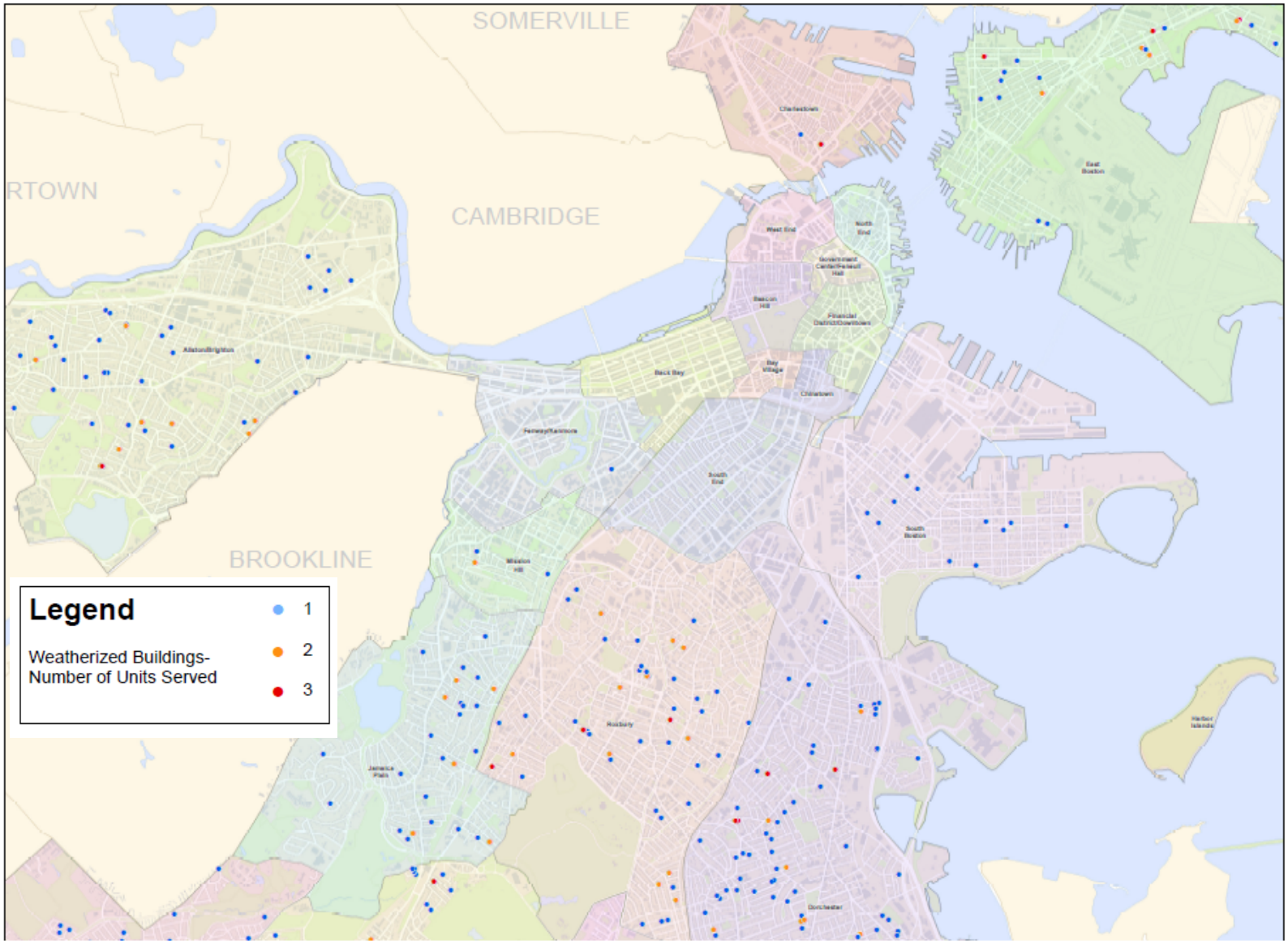
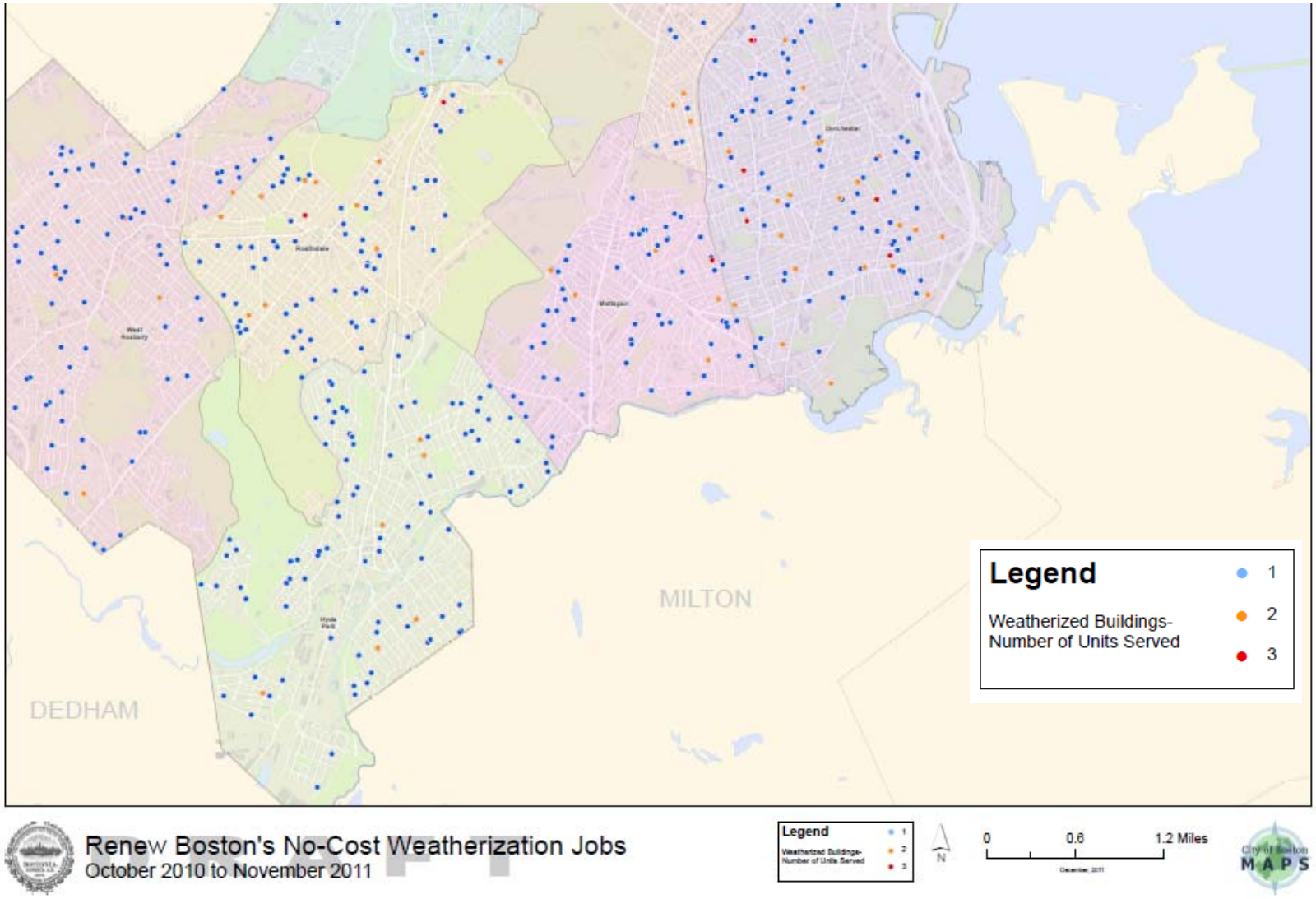


Figure R-21: Participating buildings by number of units insulated (continued)



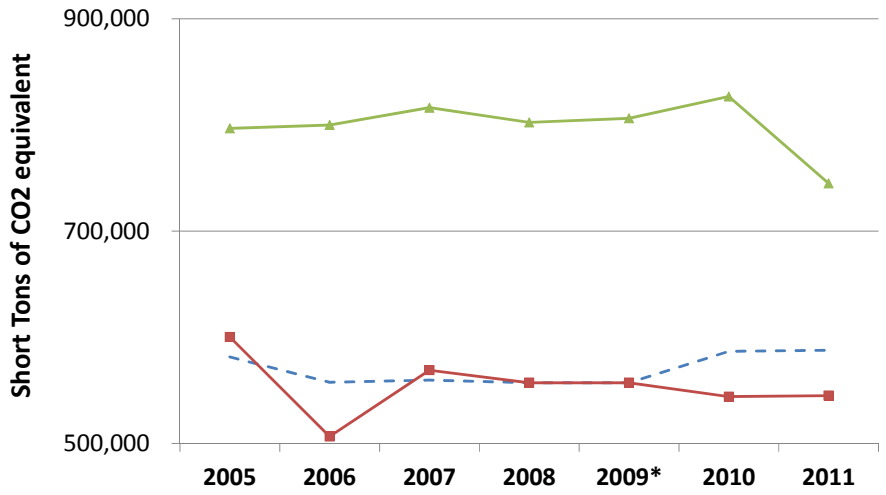
Initiative 2: Tracking (continued)

6. Residential Energy Use and Emissions. The residential sector is only 18% of city-wide GHG emissions, and is not separated out for the city-wide metrics addressed in Section 2. Renew Boston strategy has recognized from its beginning that reduction of C&I energy use is the most important way to achieve City GHG goals. Nevertheless, to assess the need for new strategies, it is critical that residential tracking monitor the big picture of energy use and GHG emissions at the level of the residential sector. Unfortunately, as shown in Figure R-22, energy use and emissions trends over the last 6 years have not been encouraging:
   - The top line shows the weather-normalized sum of GHG emissions from natural gas and heating oil, which do not show a falling trend, except for a big drop in 2011. This is despite a significant shift from oil to gas over this period.
   - The bottom solid red line shows emissions from residential electricity use (not weather-normalized). The slight decline, however, is due to a cleaner mix of power plants on the grid. Without that improvement in emission factors, emissions from residential electric use would have actually increased slightly over this period, as illustrated in the blue dotted line.

The energy use reductions from insulating homes through Renew Boston will begin to have their full effect during the current winter of 2012-2013, and this impact will not be fully seen until the energy use data for calendar year 2014.

- At that time, in the early spring of 2015, it will be possible to re-assess the need for further improvements in Renew Boston residential strategy.
- In the meantime, there is no assurance that the residential sector will be contributing sufficiently to city-wide GHG reductions.
- Therefore, Renew Boston will continue to develop new initiatives, under Strategy 4 (Greenovation Lab), to increase energy savings, as described below.

Figure R-22



The Renew Boston Residential Working Group creates the opportunity and the team to coordinate residential activity and tracking in Boston, and to develop innovations to continue increasing savings.

Strategy 2: City-Utility Alignment -- Residential

Initiative 3: Residential Working Group

The Work Group will continue to meet on a regular schedule under the direction of the Strategy Board.

Topics to be addressed in 2013 will include:	Initiative
Residential Data Protocols. Collect and review 2012 quarterly data from CSG on assessments and weatherization. Coordinate development of building and neighborhood breakdowns in tracking data. Develop approach for utilities to utilize their energy use & other data to mine targeting data on building characteristics from the City's databases. Agree on other protocols and templates for data exchange and reporting between City and utilities.	1
Strategy Board Presentations. Prepare a briefing document for Strategy Board meeting in Spring 2013 on residential participation and savings through 2012, data and tracking protocols going forward, and any recommendations to the Strategy Board. Incorporate findings on need for program rampup to meet Renew Boston's 2014 targets to be on track to meet the Mayor's 2020 goal. Develop workplan to update accordingly any Initiatives in the Strategic Plan, for implementation in 2014, and present results to the Strategy Board meeting in Fall 2013.	1
635-SAVE. Oversee integration of the City's Renew Boston phone number 635-SAVE with Mass Save intake; review call center statistics and data on Boston results.	2, 4
Whole-Building Incentive. Integrate new whole-building rebate for 2-4 family homes into Renew Boston 3.0.	4
Efficient Neighborhoods +. Plan Boston deployment of other elements of Efficient Neighborhoods+ initiative in 3-Year Plans.	4

	Initiative
Follow-up Campaign. Develop an approach to track customer actions carefully so the outreach campaign can follow up with those who still have remaining opportunities after assessments.	4
Heating Energy Sources. Review of data on use of natural gas and heating oil for residential heating, to improve estimates of oil use in Boston, and to develop ways to encourage and support the use of clean energy sources for space and water heating, including solar energy and heat pumps as well as natural gas.	6
HVAC Industry Workshop. Develop a plan for an HVAC Workshop to initiate a process to refer residents after their assessments to HVAC vendors who are experts in high-efficiency technology, to introduce this new process before the next heating season. This Workshop will also assess the need for additional approaches beyond HEAT loans to finance heating system replacements.	6, 9
Three-Decker Attic Insulation Study. Plan and oversee a study to test new ventilation solutions, including identifying sponsors and analyzing results during 2014.	7
Web Dashboard Feedback. Coordinate planning of a hackathon for apps to stimulate greater savings, including utility presentations on Green Button or other access to utility energy use data.	8
Homeowner Financing. Assess the extent to which HEAT loans have been used in Boston and assess whether new financing is needed to increase scale of insulation and HVAC replacement in Boston. Coordinate work with financing stakeholders (including the City of Boston Credit Union and GRC financial members) to develop and deploy new strategies by 2014-2015.	4, 6, 9

The no-cost insulation offer, with a massive outreach campaign, created a dramatic ramp-up of energy assessments and insulation. Renew Boston 3.0 continues the outreach without the stimulus funding.

Strategy 3: Targeted Outreach Campaign & Network

Initiative 4: Renew Boston 3.0

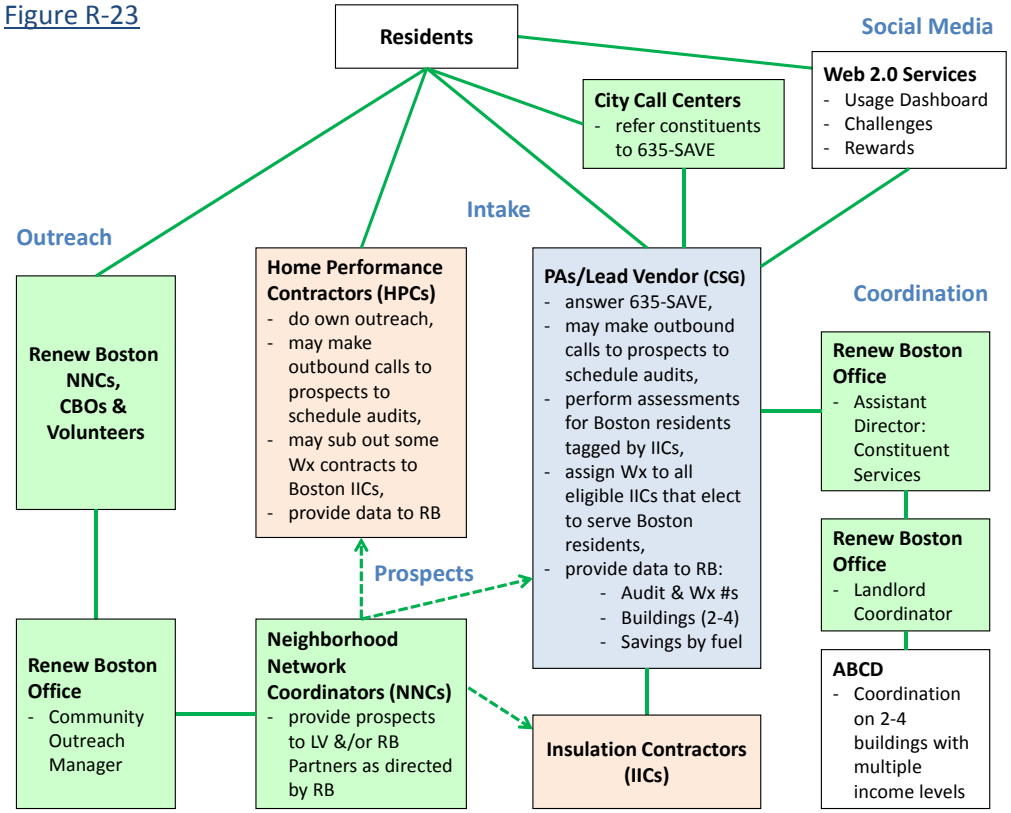
In January of 2012, when the EECBG-funded no-cost insulation offer expired, Renew Boston began its new phase "3.0" with two primary elements:

- The City will continue to support community outreach to build the most successful urban efficiency campaign.
  - The initial phase of Renew Boston outreach has been researched by two evaluators; these reports are listed on the next page and will be used to identify potential improvements.
- Renew Boston will continue to focus on making the benefits of weatherization available to tenants and other middle-income families.
  - The Renew Boston experience to date has established the need for a new insulation incentive that will continue to help tenants in 2-4 family buildings.
  - The City plans to work closely with the utilities to enhance the incentive to minimize the landlord-tenant "split incentive."

Renew Boston 3.0 will continue to evolve through the 9 approaches described below in this section.

1. Continue energy efficiency campaign. The Renew Boston outreach campaign has progressed through stages in which continuous improvements have been made, including the engagement in mid-2011 of the three NNCs and the Landlord Coordinator. The City, with its partners, will continue to support community outreach to build the most successful urban efficiency campaign, through the structure illustrated below.

Figure R-23



Initiative 4: Renew Boston 3.0 (continued)

The next phase of Renew Boston outreach will build on the experience to date. The two evaluation studies listed below will be used to identify potential improvements. These studies confirm that Renew Boston has had significant success to date stimulating participation and energy savings. Nevertheless, this evaluation work has indicated areas where improvements could help Renew Boston to achieve its ambitious goals in the future.

Report for utilities & EEAC ("ODC Report")

- Citation: Community-Based Partnerships, 2011 Evaluation Final Report, Draft, Massachusetts Special And Cross-sector Studies, Prepared For Massachusetts Utilities, Prepared By Opinion Dynamics Corporation And Evergreen Economics, July 2012
- http://www.ma-eeac.org/docs/2011%20to%202012%20EMV/Cross%20Cutting_General/MA%20CC%20CBP%20End-of-Year%20Report%20-%20FINAL.pdf
- This study was a "process evaluation" and included interviews with partnership staff and stakeholders and analysis of participation and energy savings.
- The study also included phone interviews during November and December of 2011 with 74 residents (out of 2,170 participants) and 70 businesses (of 629 participants).
- In addition to quantifying the impact to date, this evaluation work has reinforced the framework for combining community-based outreach with financial support, including through the diagram in the Figure F-1 from the ODC Report on the next page.

Report for Barr Foundation ("Goodman Report")

- Citation: Renew Boston Residential Energy Efficiency Program Evaluation Report, by Goodman Research Group for Mass Energy Consumers Alliance, October 2012.
- http://www.barrfoundation.org/files/Renew_Boston_Residential_Energy_Efficiency_Program_Evaluation_Report_-_Oct_2012.pdf
- The evaluation goal was to "assess the effectiveness, within the target population in Boston, of the strategies used to overcome barriers to implementing home energy efficiency upgrades."
- The focus of this study was the 8,415 Boston households with Home Energy Assessments conducted from July 2010 to April 2012. An on-line survey was done during the summer of 2012 of a sample of 338 of these households, along with 29 phone interviews with who did not move forward with all of their recommendations.

This Strategic Plan and both of these reports will also be posted at:

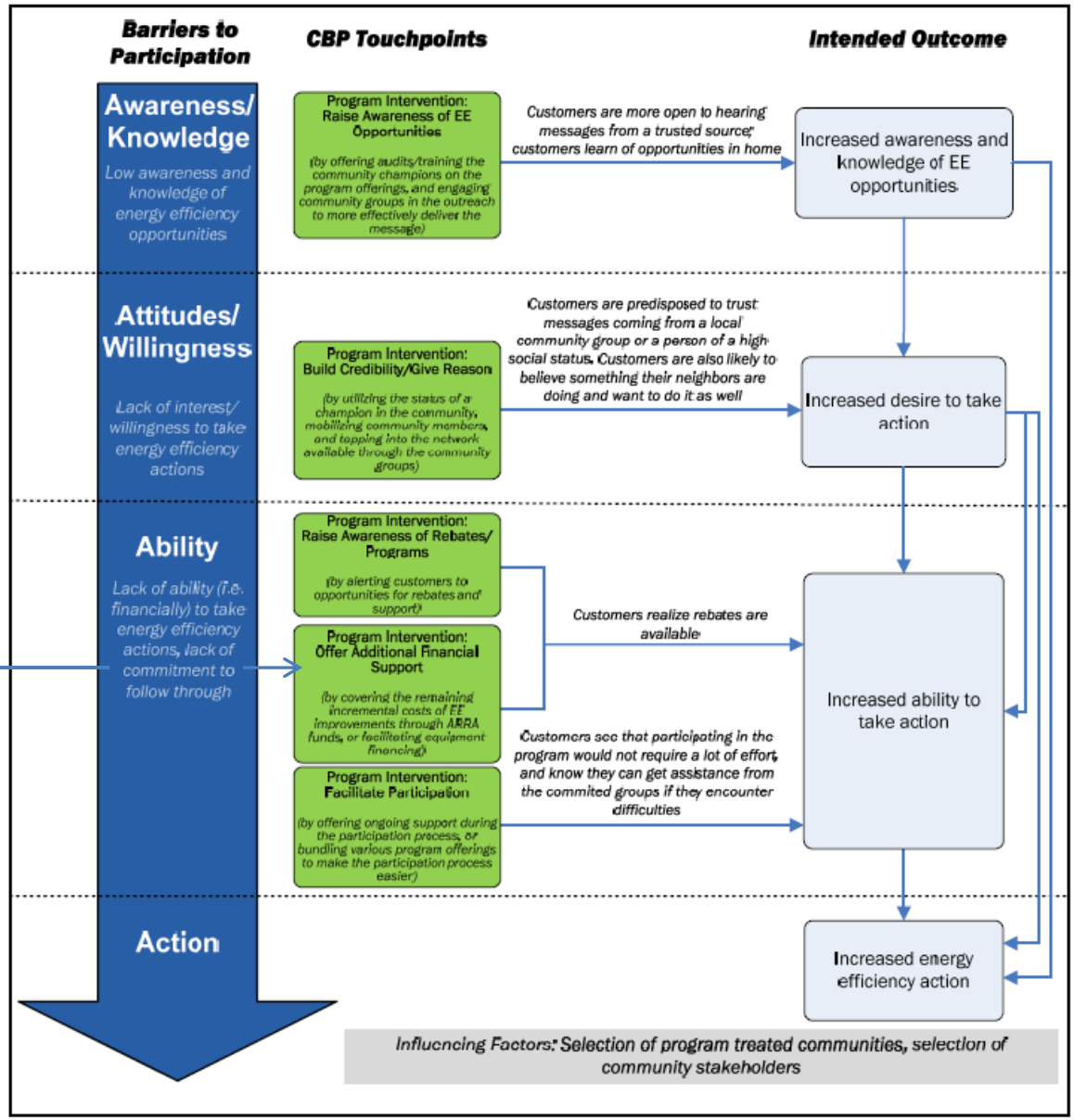
http://www.cityofboston.gov/environmentalandenergy/conservation/Renew_Boston.asp

Please also visit:

http://www.renewboston.org/

Figure R-24

Figure F-1. Depiction of Theory of Change



The EECBG-funded "no-cost insulation" offer was successful in increasing Intake through December of 2011, and also in increasing weatherization among middle-income families and tenants. This experience has established the need for a new whole building insulation incentive that will continue to help tenants in 2-4 family buildings by minimizing the landlord-tenant "split incentive" barrier.

Source: Community-Based Partnerships, 2011 Evaluation Final Report, Draft, Massachusetts Special And Cross-sector Studies, Prepared For Massachusetts Program Administrators, Prepared By Opinion Dynamics Corporation And Evergreen Economics, July 2012, page 21.

Respondents to two surveys reported high levels of trust in Renew Boston and its outreach and partner organizations, with variations depending on the question and the sample.

Initiative 4: Renew Boston 3.0 (continued)

2. Shift outreach to most successful methods. According to the Goodman Report, "Our results indicate that word-of-mouth is, by far, the most popular marketing strategy for inducing residents to get a Home Energy Assessment conducted. However, this strategy has average implementation rates of less than 40%." "In contrast, community outreach and door knocking reach only about half as many residents as does word-of-mouth, yet these two marketing strategies have implementation rates (partial or full) near 80%...."
3. Support outreach by the most successful organizations. 87% of respondents to the Goodman survey had "some" or "a lot of" confidence in "City of Boston/Renew Boston", compared to 66% for "utility companies" and 64% on the average for a list of community organizations. However, Goodman found a wide range of confidence in community organizations, with a big impact on implementation:
    1. While on the average only 64% had confidence over a larger number of groups, there were 7 organizations for which 79% to 89% had confidence.
    2. The level of confidence in the community group from which they heard about the Home Energy Assessment also makes a big difference in whether they implement all or just some of the recommended actions; 46% of those who have confidence in the group(s) implemented all the recommendations, compared to only 24% of those who did not have confidence in the groups.

Trust & Outreach, from ODC Evaluation Report

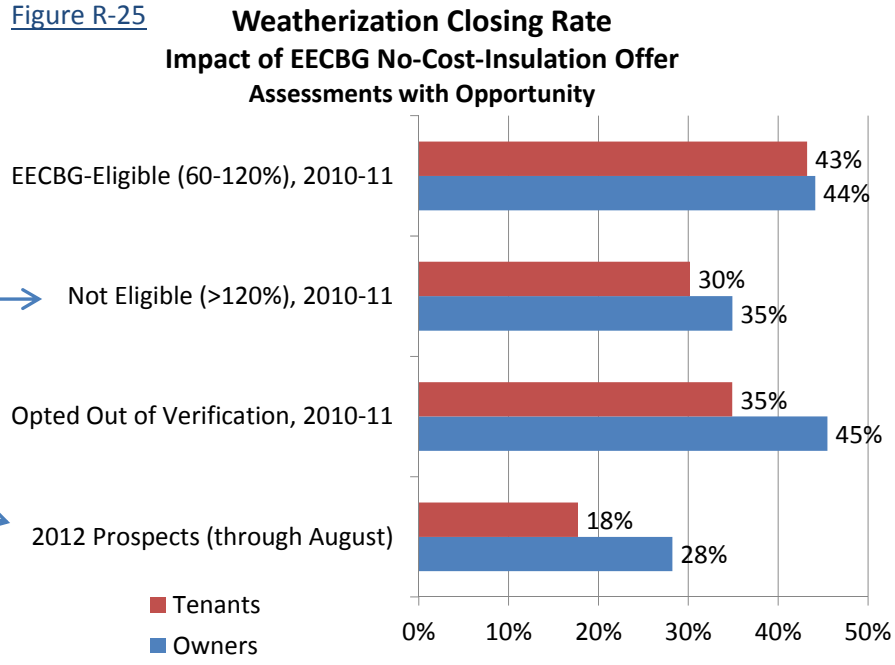
- According to the ODC Report, the percent of respondents to the ODC survey who say they "trust" the following organizations "a fair amount" or "a lot" was:
    1. 88% for the "City of Boston"
    2. 84% for "NSTAR or National Grid"
    3. 84% for "neighborhood-based organizations"
    4. 55% - 61% for TV, radio and newspapers
- In a different set of questions from the ODC survey, 92% of respondents could remember the name of the community organization through which they "heard about Renew Boston," and 91% of them "trust the information coming from the organizations" "a fair amount" or "a great deal".
- Separately, the percentage telling ODC that the information from the following sources was "influential" (6 or 7 on a scale from 1-7) on the decision to get an assessment was :
    1. 72% for "local community organizations"
    2. 65% for "NSTAR or National Grid"
    3. 65% for the "Renew Boston website"
    4. 57% for the "City of Boston representatives".

The no-cost insulation offer, with a massive outreach campaign, created a dramatic ramp-up of energy assessments and insulation. Renew Boston 3.0 continues the outreach without the stimulus funding.

Initiative 4: Renew Boston 3.0 (continued)

4. Assess the Impact of the EECBG funding. Since its first availability in September of 2010, the no-cost insulation offer has been significant:
   - The extent to which the no-cost offer made a difference is shown by the tracking data from NSL. Specifically, as detailed in the bar chart in Figure R-25 to the right, for prospects who signed up for Renew Boston through December 31, 2011, those who were eligible for the no-cost offer insulated their homes at a greater rate (43-44%) than those who were not eligible (30-35%).
   - Since the no-cost offer expired, a much lower percentage of participants have been able to follow through. For 2012 prospects who had Home Energy Assessments through August but who faced the need to pay the 25% "co-pay", only 28% of homeowners and only 18% of tenants with savings opportunities have scheduled insulation. This weatherization rate is 36% lower for homeowners and 58% lower for tenants, compared with families who received the EECBG funding for their co-pays.

Figure R-25

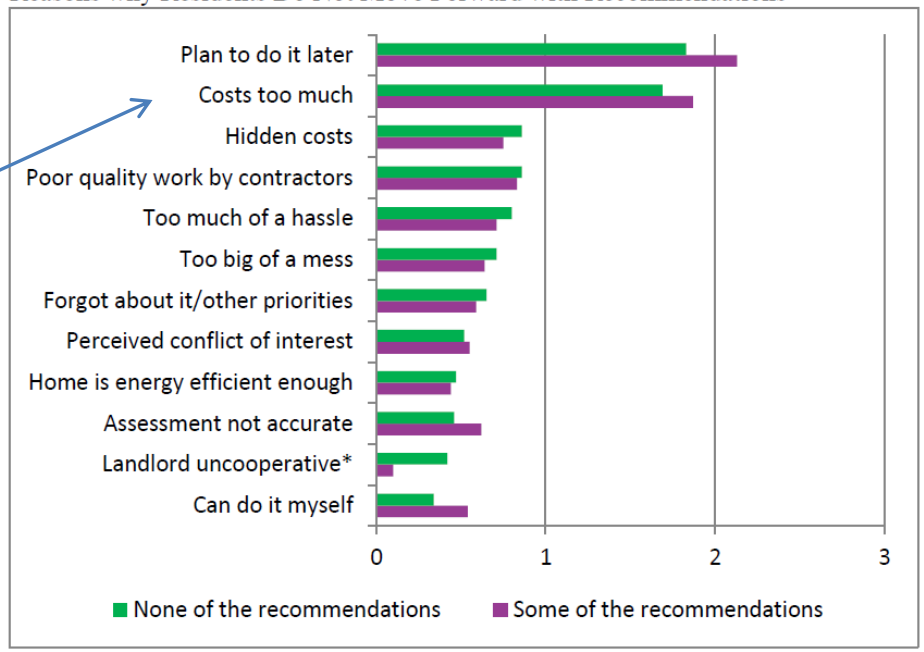


Initiative 4: Renew Boston 3.0 (continued)

5. Understand Cost as a Barrier. Even when the no-cost insulation offer was still in effect, the cost of some or all of the recommendations in the home energy assessment was a barrier to implementing them for a large number of respondents. This is illustrated in the bar chart to the right from the Goodman survey.
   - Some of the respondents saying it "costs too much" may have been ineligible for the no-cost insulation, and others may have been unable to afford other measures such as a furnace replacement or fixing a "pre-weatherization" barrier.
   - For an owner-occupant landlord of a three-decker with typical savings and costs identified by Boston energy assessments, Figure R-27 shows an example of the 7.5-year payback faced by the landlord to weatherize all three of the units, since the landlord would have to pay an additional $2,000 for no additional savings from the tenant units.
6. Develop a New Whole-building Incentive. In view of the clear evidence provided by Renew Boston of the need to further reduce the cost of insulation for some "hard-to-serve" families, Renew Boston has proposed a new whole-building rebate to help landlords and their tenants in 2-4 family homes. Renew Boston has been working with its utility partners to encourage and assist with such an approach, and expects to integrate a new whole-building incentive into Renew Boston 3.0 in 2013.

Figure R-26

Reasons why Residents Do Not Move Forward with Recommendations



N=78; 83

Response scale: 1 (this doesn't apply to me at all), 2 (this applies to me a little), 3 (this applies to me somewhat), 4 (this applies to me a lot).

Figure R-27

	1 Unit	All 3 Units	2 Tenant Units
Insulation cost	$ 3,000	$ 9,000	$ 6,000
Landlord's own savings/year (1 unit)	$ 400	$ 400	
Existing incentive structure:			
75% incentive up to $2,000	$ 2,000	$ 6,000	$ 4,000
Landlord's cost	**$ 1,000**	**$ 3,000**	**$ 2,000**
Landlord's payback	2.5	7.5	No Payback

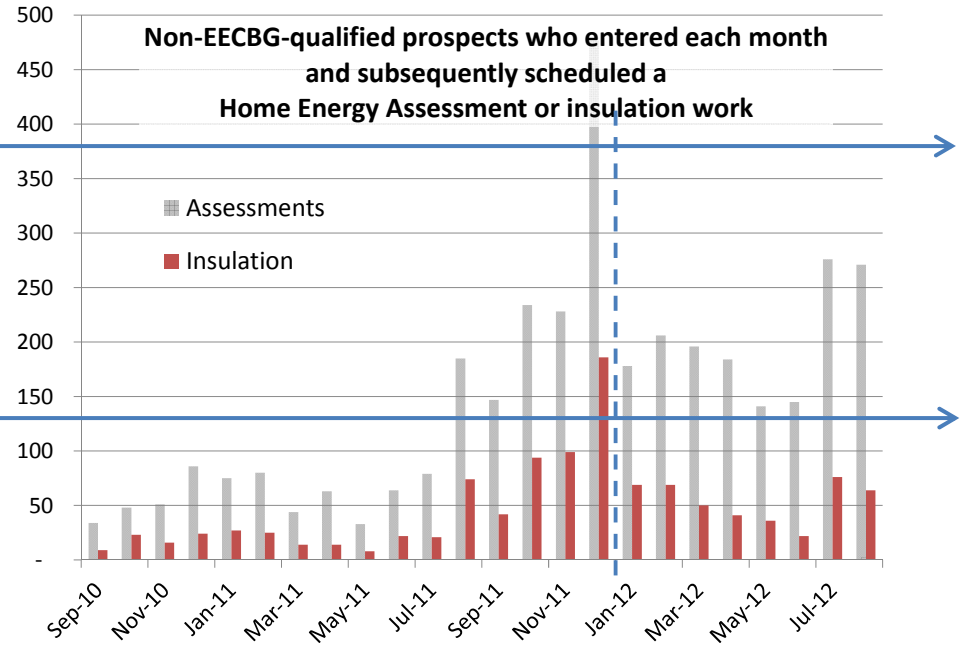
Initiative 4: Renew Boston 3.0 (continued)

7. Work with Renew Boston Home Performance Contractor (HPC) Partners. Renew Boston 3.0 has pre-qualified two Mass Save HPCs to whom the City will refer leads from the Renew Boston outreach campaign, as illustrated in Figure 23 above. Renew Boston will work with these vendors to continually improve and increase resident participation.
8. Work with Insulation Contractors. Now that the Boston market is open for Independent Insulation Companies (IICs) to sell insulation services in Boston, Renew Boston will directly contact the companies operating in the area to encourage them to initiate or resume sales activity and to assure them that the City supports the development of a robust market for energy efficiency services. This will be taken up in the 2nd or 3rd quarters of 2013, after the Renew Boston 3.0 outreach and referral arrangements have been successfully developed and implemented with the pre-qualified HPCs. Renew Boston will also consider providing some referrals from the Renew Boston outreach campaign to IICs which meet appropriate criteria.
9. Set & Track Participation Metrics. Renew Boston will set monthly and annual targets for total number of prospects, assessments, weatherization projects and HVAC system replacements. Figure R-28 summarizes initial targets for 2013 (subject to change when complete 2012 data has been received from all vendors and discussed with partners). Renew Boston 3.0 began in January 2012, but the spring and summer were devoted to completing insulation work for prospects who signed up before the end of 2011. Then, for August through November an average of 726 prospects were signed up for Renew Boston. The monthly target of 800 prospects is seen as conservative. The other rates in Figure R-28 are based on experience to date (see Figure A-6 in the Appendix).

Figure R-28: Initial Participation Targets for 2013

	Rate	Monthly	Annual
Prospects		**860**	10,320
Assessments	45%	**390**	4,640
Insulation	33%	**130**	1,560

Figure A-13 (from Appendix)



Initiative 5: Green Affordable Housing Program for Multi-Family Buildings

Renew Boston 3.0 will continue to work with the City's Green Affordable Housing Program, administered through the Department of Neighborhood Development (DND), to coordinate the multiple funding streams in Massachusetts dedicated to low-income multi-family energy efficiency projects.

Boston's Green Affordable Housing Program was originally created in 2006 to implement a $2 million grant from the Massachusetts Renewable Energy Trust (now the Massachusetts Clean Energy Center) to integrate solar photovoltaics (PV) in low-income multi-family projects. Administration of this grant enabled DND to "green" its affordable housing program comprehensively with renewable energy, energy efficiency, green building techniques and healthy homes strategies, and to require Leadership in Environmental and Energy Design (LEED) Silver level. The program also developed "solar-ready" design guidelines that enable solar electric and/or solar thermal systems to be installed at a later date on projects when renewable energy funding support is not available, a project used by the National Renewable Energy Lab in 2009 when it developed its 2009 Solar Ready Buildings Planning Guide.

Renew Boston reinvigorated the Green Affordable Housing Program with $1.1 million EECBG funding. The Boston Redevelopment Authority, the City's planning and economic development agency, provided another $1 million. These funds were designed to work in concert with the Low-Income Multifamily Retrofit program, an initiative of Massachusetts utility companies and the Low-Income Energy Affordability Network (LEAN), administered in Boston by Action for Boston Community Development (ABCD), and the Green Retrofit Initiative, a program of the Local Initiatives Support Corporation (LISC) to help Boston community development corporations (CDCs) make their affordable housing more green and energy efficient. Renew Boston convened regular meetings of this network to review utility-funded projects and allocated EECBG and BRA funding to projects with long-term benefits that did not meet the benefit cost ratio required for utility incentives or that involved technology or complementary energy work not eligible for utility program funding. These projects included 2 cogeneration systems (each 75 kW) and 6 replacements of natural gas boilers.

- These boiler replacements reduced gas consumption for these buildings by an average of 34% over the first year.

Under Renew Boston 3.0, although EECBG funds have been spent, the Green Affordable Housing Program will continue to coordinate planning and funding by convening regular meetings with DND, BRA, the utility-funded program administrators (LEAN/ABCD), LISC's Green Retrofit Initiative (supporting Boston CDC projects), and two 2012 recipients of U.S. Housing and Urban Development (HUD) awards: (a) New Ecology, Inc., which received $989,275 to implement energy conservation measures in about 2,700 affordable units in Massachusetts and (b) NRG Solutions LLC (Winn), which received $5.25 million to help establish a Multifamily Energy Loan Fund to retrofit about 1,200 units in low-income property in multiple locations including Massachusetts. In May 2013, Renew Boston 3.0 will convene a conference to further coordination of these multiple funding streams.

Strategy 4: Residential Greenovation Lab

Introduction to Strategy 4

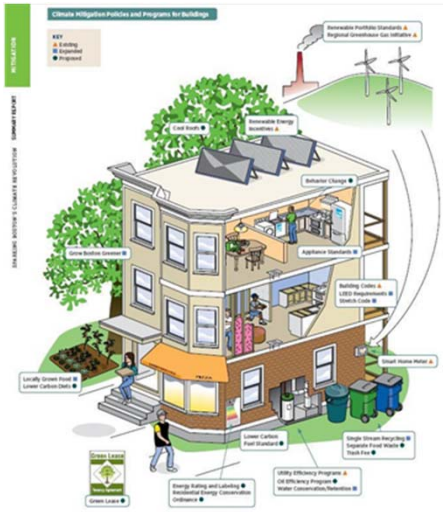
- For residential energy users, Strategy 4, the Greenovation Lab, consists of 4 new Initiatives that extend the elements of Strategy 3 further beyond the established framework and the level of savings targeted by the statewide Three-Year Plan for utility energy efficiency programs. The first two of these Initiatives are directed at savings measures with which the existing programs have had little or no success: furnace and boiler replacements, with a further focus on two to four-family buildings.
  - Three-Decker HVAC. Renew Boston has begun to work on the question of how to increase the rate at which old inefficient furnaces and boilers are replaced.
  - Three-Decker Attic Insulation. At the same time, Renew Boston has raised with its partners and with other City and state agencies the need to develop technically sound approaches to insulate Boston's many flat roofs, or the attics under them.
  - Web Dashboard Feedback. The third Residential Initiative under Strategy 4 is still under development but seeks to use new IT, web and mobile technologies not only to increase participation in standard efficiency programs (such as home energy assessments), but more importantly to drive behavior change through social marketing.
  - New Homeowner Financing. HVAC replacements will require additional financing due to the much greater cost
- These new residential Greenovation Lab Initiatives will be developed primarily through the Residential Working Group, which also constitutes Residential Initiative 3 as described above.
- Renew Boston will rely on innovation from the private sector, inviting the most forward-thinking vendors and startups to work together to present Bostonians with practical ways to save energy beyond the measures in the Mass Save program.
- Together, these initiatives, and others which the City and its partners may identify in the future, will be designed to fill the anticipated gap between the savings that can be achieved through the Strategy-3 Initiatives and the savings that will be needed to stay on track to meet the targets described in Section 2 above.

Renew Boston
Save Energy, Save Money
Thomas M. Menino, Mayor

Initiative 6: Three-Decker HVAC

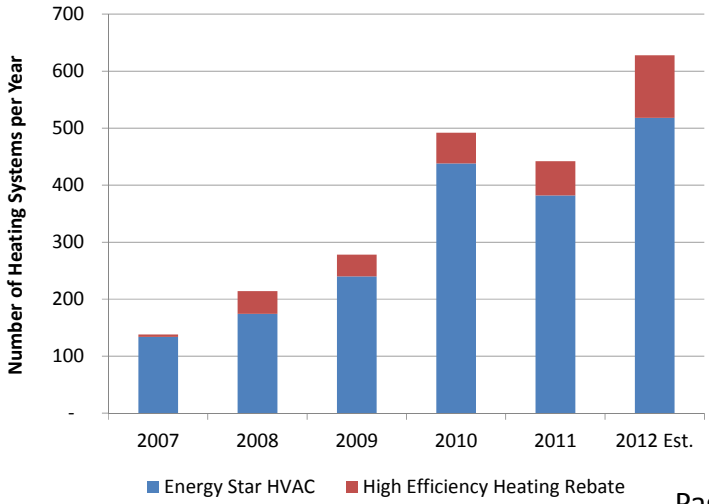
- Only 50-100 oil heating systems are upgraded in Boston each year with rebates from the electric efficiency programs, as shown in the top red portions of the bars in Figure R-30 to the right.
  - Figure R-30 is based on data only from NSTAR, and will be completed with comparable National Grid data, which will cover natural gas heating systems.
- High-efficiency heating systems are readily available in the market without new technology, and the innovation needed is to improve the sales process and financing options to achieve an increasing number of installations.
- During the first quarter of 2013, Renew Boston will assemble additional data from both utilities on heating system replacements and compare these rates with data from NSL on age of systems encountered in Boston assessments, to identify remaining opportunities and unmet needs.
- Renew Boston will invite representatives of the HVAC industry to a workshop in City Hall, along with representatives of utilities and efficiency vendors, to initiate by mid-2013 a new referral process after the assessment, at least for the pre-qualified Renew Boston HPCs, and to assess the need for additional financing approaches beyond HEAT loans.
- Renew Boston will review data on use of natural gas and heating oil for residential heating and work to improve estimates of oil use in Boston, and will develop ways to encourage and support the use of clean energy sources for space and water heating, including solar energy and heat pumps as well as natural gas.

Figure R-29: A Green Three-Decker



- Renew Boston will continue to support the work of the Landlord Coordinator, who will help with this Initiative. This work will also be coordinated with the City's Home Center, administered by the Department of Neighborhood Development (DND), and its Three-Decker improvement program, "3-D."

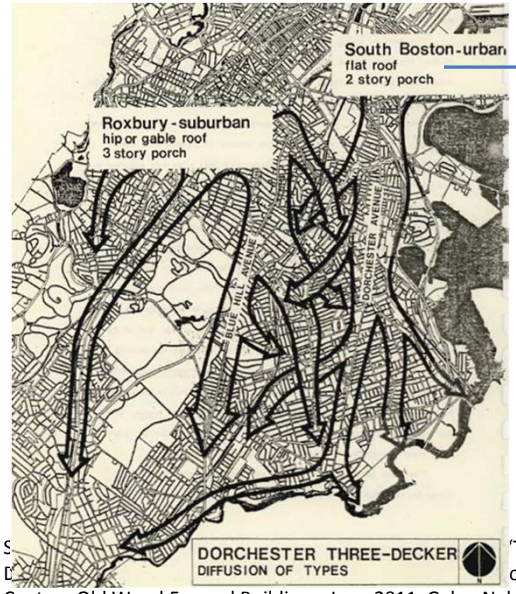
Figure R-30



Initiative 7: Three-Decker Attic Insulation

- Mass Save does not provide any incentive for insulating or air sealing the attic under a flat roof, due to concerns about moisture problems.
  - See: Home Energy Assessment Standards and Standard for Materials, Installation.
- To address this challenge, Renew Boston held a Flat Roof Weatherization Best Practices Workshop in June 2011 at the Boston Redevelopment Authority.

Figure R-31



S… 'Triple
D… ork in
Century Old Wood Framed Buildings, June 2011, Galen Nelson, Boston Redevelopment Authority, www.greentechboston.org

- The conclusion from this workshop was that Renew Boston should work with the utilities and with state agencies to conduct a study to test a new practice to install ventilation to avoid moisture build-up while insulating under flat roofs.
  - This study would first measure the relative humidity and the moisture content of the wood frame members, with multiple readings over a winter in 5 to 10 buildings.

Figure R-32

- Renew Boston will work with its partners to identify sponsors and funding to conduct this research during the 2013-2014 winter and to analyze results during 2014.
- If necessary, a wider pilot-test could be conducted in the next winter, with the goal of implementing a new Mass Save standards before the fall of 2015.

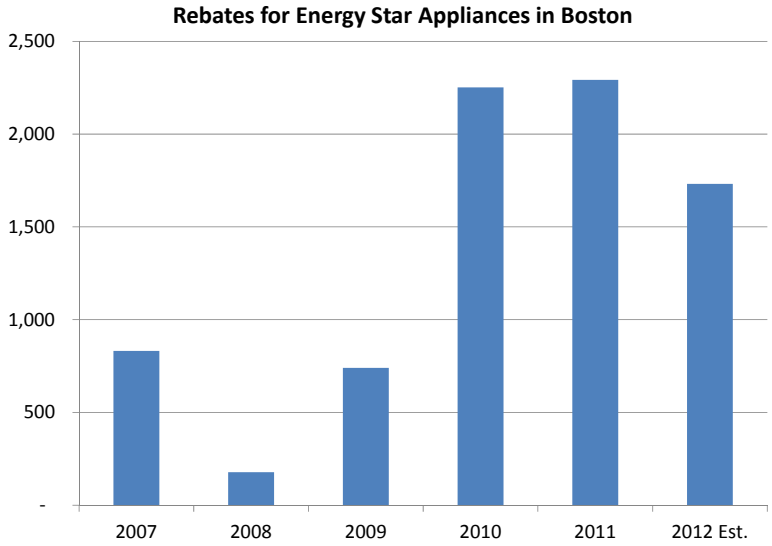
Initiative 8: Web Dashboard Feedback

- Renew Boston will organize a hackathon in the first half of 2013 to find the most effective and engaging apps or platforms to stimulate greater savings in Boston, including uses for public benchmarking data (including apartment and condo buildings). The goal will be to improve the web and social networking services available to Bostonians to manage their energy use and climate footprints, as illustrated in the Renew Boston 3.0 flow chart in Figure R-23 under Initiative 4.
- It is now timely to take this initiative because access to utility data is no longer the barrier to innovation that it once was, partly due to the federal Green Button protocol, and partly because the real action is now in the competition between vendors to innovate ways of putting the data to use to stimulate more savings.
- Renew Boston will also encourage its pre-qualified HPCs to incorporate feedback and other tech-savvy engagement techniques into their relationships with their Boston customers.
- Dashboard tools could also encourage energy savings by consumers not interested in energy audits, such as purchase of Energy Star appliances, which could be increased above the levels shown in Figure R-33.
- Renew Boston will also work with utility partners through the Residential Working Group to encourage deployment in Boston through development of a statewide approach to incorporate these feedback and engagement functions into residential programs.

Initiative 9: New Homeowner Financing

- Renew Boston will work through the Residential Working Group to collect and review heat loan data for Boston residents and lenders, to assess the reasons for the pattern of HEAT loan use in Boston and its impact on energy savings, and to evaluate whether new financing is needed to increase scale of insulation and HVAC replacement in Boston.
- If new financing is needed, Renew Boston will work with financing stakeholders (including the City of Boston Credit Union and GRC financial members), state agencies and Renew Boston partners to develop and deploy new strategies by 2014-2015.

Figure R-33



Appendix: Residential Participation to Date

Contents

Boston has exceeded the participation goal set in 2010 to double the level of residential participation in all residential energy efficiency programs from approximately 3% to 6% per year by 2012.

1. Participation Across All Efficiency Programs
   - In the March 2010 Phase 1 Recommendations Report, the Residential Participation Goal was stated as follows:
     - Double the level of residential participation in all residential energy efficiency programs from approximately 3%/year over the last 3 years to 6% over the next 3 years (2010-2012), and then maintain annual participation at the level of 15,000 households/year through 2017, and serve 150,000 households between 2010 and 2020. This was illustrated in Figure 1 from Section 2 of this Plan.
   - This goal was met for the 2010-2012 period. The following numbers are based on data from NSTAR for participation in each electric efficiency program, plus an estimate of participation in National Grid programs:
     - Boston residential participation in energy efficiency programs was 6.8%/year
     - Annual participation averaged 16,900 households/year, and
     - 50,700 households were served.
     - These programs included not only Mass Save but also all the other residential programs, such as rebates for Energy Star appliances and the Low-Income and Multifamily programs (but not including lighting and appliances, to avoid double-counting).
   - The participation in these programs is charted for each year in Figure A-1, showing the more than doubling of activity and the high level reached in 2012.

Figure 1: Residential Participation Target (Households)

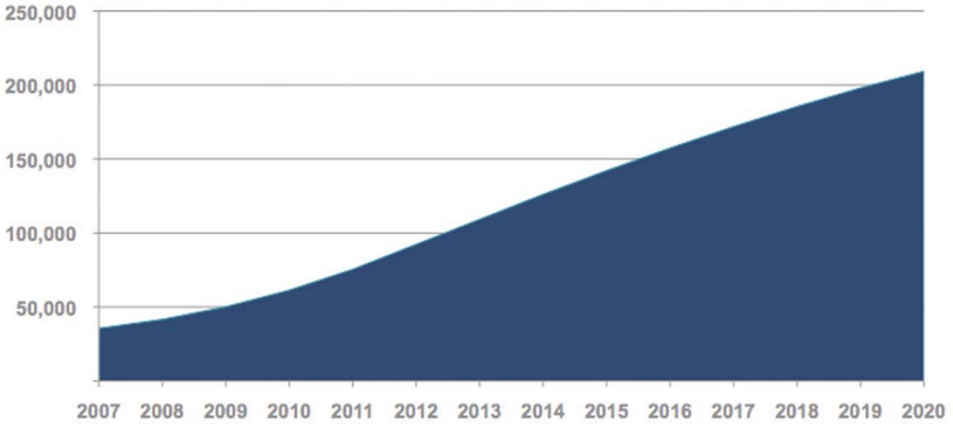
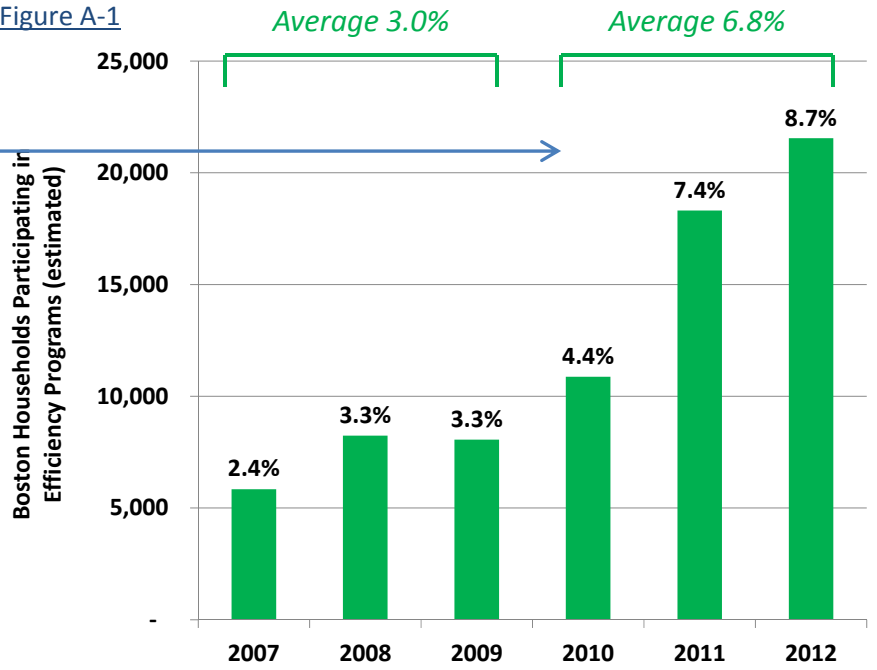


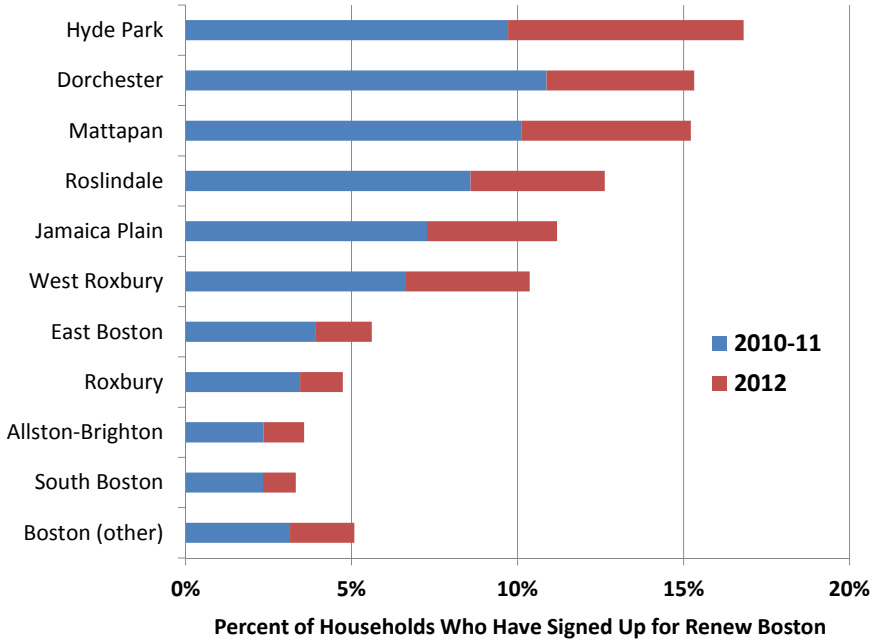
Figure A-1



Over 18,000 Bostonians signed up for Renew Boston. This is 8.5% of Boston households. Six neighborhoods exceeded this average, with signups in the 10-15% range.

2. Growth of the Renew Boston Outreach Campaign
   - While many may have heard the Renew Boston energy efficiency message, approximately 18,600 Bostonians took action by "signing up" for Renew Boston, meaning that they provided their name and contact information to discuss arranging a Home Energy Assessment. This was a rate of 690 prospects/month and totals 8.5% of Boston households.
   - The chart in Figure A-2 how this percentage of households who signed up for Renew Boston varies in different parts of the City:
     - Over 15% have signed up in Hyde Park, Dorchester and Mattapan
     - 10-15% signed up in Roslindale, JP and West Roxbury
     - In most of the rest of the City, 5% or fewer of the households have signed up, indicating a need to reassess the outreach strategy for these areas.
   - Additional analysis of this data is presented further below.

Figure A-2

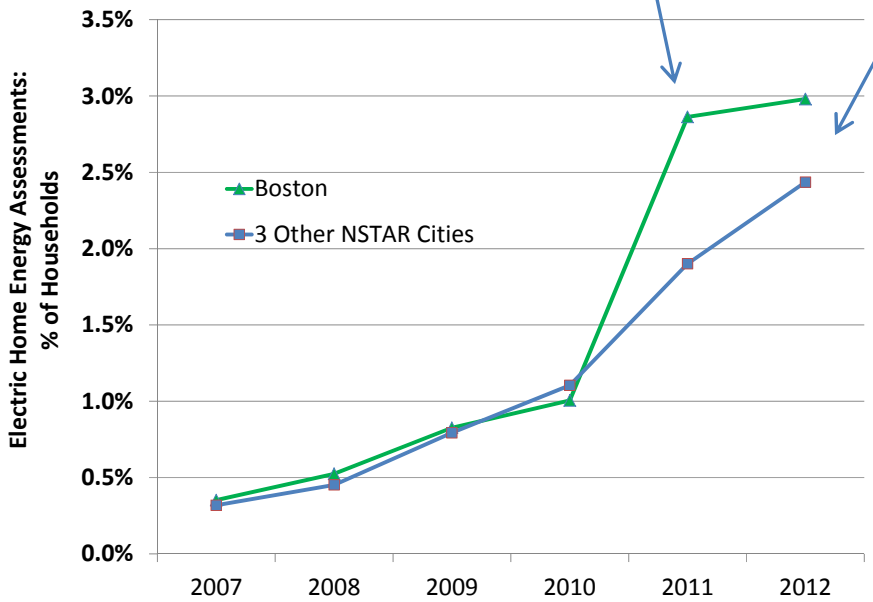


Boston tripled the penetration of Home Energy Assessments, from a level of approximately 1% of residential customers in 2010 to approximately 3% in 2011 and over 4% in 2012.

3. Growth in Home Energy Assessments

- Boston experienced modest growth through 2010 in the percent of households participating in the "Residential Conservation Service" (which is approximately equivalent to the number of Mass Save electric utility assessments).
  - In the first full year of Renew Boston, 2011, the penetration of assessments by NSTAR tripled from 1% of Boston households to almost 3% in 2011 (without counting gas utility assessments), as shown in Figure A-3 below.
  - Assessments by both electric and gas utilities reached 4.1%/year in Boston as a percent of units in one to four-family buildings.
  - Activity is growing in other cities as well, but Boston's penetration surge is more pronounced partly due to the effect of Renew Boston. For 2007 through 2010, the penetration was tracking closely (within about a tenth of a percent) for three other NSTAR cities (Somerville, Chelsea and New Bedford), but Boston diverges in 2011 and 2012.
  - The above data over this 6 year period is limited to NSTAR electric assessments, because NSTAR has provided this time-series data back to 2007.
- Another set of data has been provided jointly by both utilities for just Boston residents, beginning with 2010. This information is quarterly, prepared by the Lead Vendor (CSG), and more precisely specifies both the number of home energy assessments and also the number of homes which are insulated and air-sealed. These participation totals are tabulated in Figures A-4 and A-5 on the next page.
  - The number of Mass Save Home Energy Assessments conducted in Boston (for both electric and gas utilities) almost tripled from 2,539 in 2010 to 7,249 in 2011 and leveled off to 7,270 assessments in 2012, including all vendors and income levels.
  - The assessments done for families with incomes eligible for the no-cost insulation offer peaked in 2011, but assessments for above-income residents grew to a robust level of 5,800 in 2012.

Figure A-3



4. Growth in Weatherization

- The utilities are jointly providing Renew Boston with very helpful tracking data on a quarterly basis, assembled by CSG, which is summarized in Figure A-4 below.
  - Through 2012 these reports separated the families with incomes eligible for the no-cost insulation offer from other residents, although now that this offer has expired (at the end of 2011), this separation will not continue going forward.

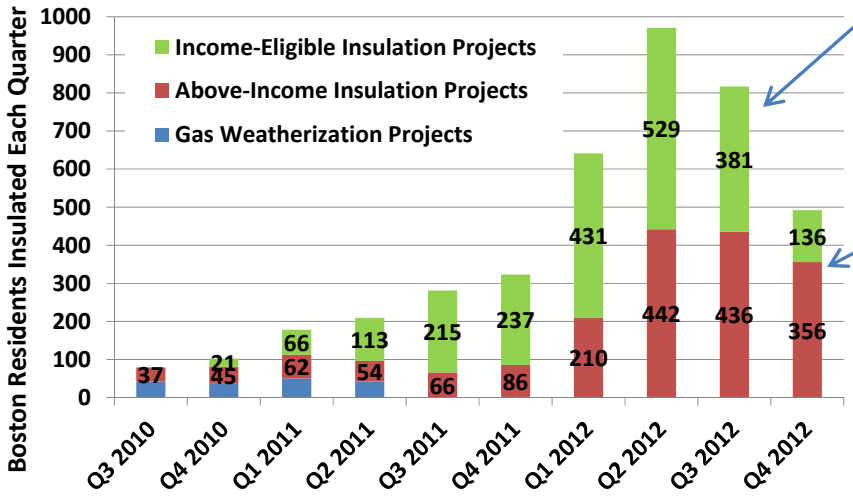
Figure A-4: Annual Participation Data Provided by Utilities

		2010	2011	2012	Total
	All Bostonians				
1	Unique Assessments	2,539	7,249	7,270	17,058
2	Air Seal &/or Insulation (Distinct Sites within the Pedriod)	272	972	3,051	4,295
3	Weatherization Projects with Insulation	234	899	2,921	4,054
4	Insulation Rate as % of Assessments	9%	12%	40%	24%
5	Gas Weatherization Projects	322	92	0	414
6	Total Air Sealing &/or Insulation Projects	**594**	**1,064**	**3,051**	**4,709**
	Income-Eligible for EECBG				
7	Unique Assessments	671	3,442	1,470	5,583
8	Weatherization Projects with Insulation	**21**	**627**	**1,477**	**2,125**
9	Insulation Rate as % of Assessments	3%	18%	100%	38%
	Above-Income				
10	Unique Assessments	1,868	3,807	5,800	11,475
11	Weatherization Projects with Insulation	213	272	1,444	1,929
12	Insulation Rate as % of Assessments	11%	7%	25%	17%
13	Gas Weatherization Projects	322	92	0	414
14	Insulation Projects	**535**	**364**	**1,444**	**2,343**

- The number of Home Energy Assessments roughly tripled from 2,539 in 2010 to approximately 7,250 in both 2011 and 2012 (in row 1), for a total of 17,058 over the three-year period.
- Boston more than tripled the penetration of insulation and air sealing (collectively called "weatherization") from 594 housing units in 2010 to an average of 2,050 units in 2011 and 2012.
  - Virtually all (94%) of the weatherization projects included insulation.
    - In this Plan document, most of the figures for homes insulated ignore the few housing units that received only air sealing, and the terms insulation and weatherization are often used interchangeably.
- Renew Boston offered services most directly to middle-income families, through the no-cost insulation offer; through 2012, a total of 2,125 such projects had been tracked by the utility program vendor.
  - The rate at which units having had assessments undertook weatherization was 38% for income-eligible families – more than twice as often as for families with higher incomes who had to cover their own 25% co-pay. This is consistent with the findings elsewhere in this Plan that increased incentives have been effective in serving middle-income families.

- The rapid changes in weatherization in Boston are striking when the data are broken down by quarter, as shown in Figure A-5 below.

Figure A-5: Quarterly Weatherization Data Provided by Utilities



- The insulation projects for EECBG-eligible families are illustrated in the top, green segments in the bar chart. Most of these have been completed by the end of 2012.
- The red bar segments suggest the potential for weatherization activity going forward, since the EECBG-funded no-cost offer has expired.
  - The last three quarters averaged 411 weatherization projects, or a rate of 137/month.
  - This is near the level of 130 weatherization contracts per month that Renew Boston has set as the "Initial Participation Target" for 2013, illustrated in Figure R-28 under Residential Initiative 4.

5. Rates of Conversion from Prospect to Assessment to Insulation

   a) Renew Boston has been tracking the Bostonians who "sign up" to discuss Home Energy Assessments, to understand how many end up having an assessment, and how many of them end up insulating their homes. Each assessment saves energy, but encouraging insulation is a key goal for Renew Boston. The results to date have been as follows, and as shown in Figure A-6 below:
      - 46% of prospects had an assessment performed,
      - 70% of those assessments found an opportunity for weatherization, and
      - 47% of those scheduled weatherization work, representing 33% of all the assessments.

   b) The 33% "weatherization rate" at which all assessments yielded insulation projects compares favorably with the experience of Mass Save in other times and places. The 33% rate reflected an equilibrium balance of assessment and contracting work, after sufficient time for weatherization to "catch up" with the rapid rise of assessments in 2011.
      - This pattern is shown in Figure A-7. At the end of 2011, the cumulative weatherization rate was 15%, but since August 2012 it has stayed at 32% to 33%.
      - This may explain the figures in the ODC Report (on pages 29-30) suggesting that, *for the last 6 months of 2011*, "of the total number of prospects… 3% had weatherization work performed" and 15% of audits yielded weatherization, which is not an accurate picture of Renew Boston results to date.

Figure A-6: Weatherization Data Provided by Next Step Living

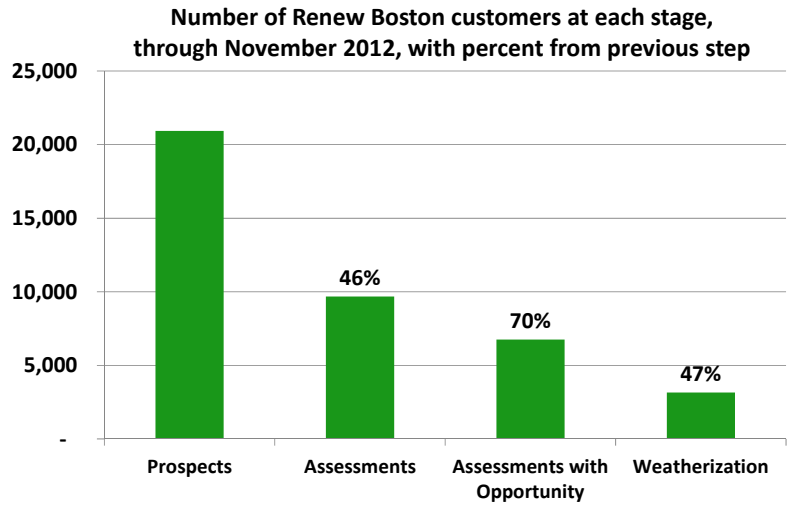
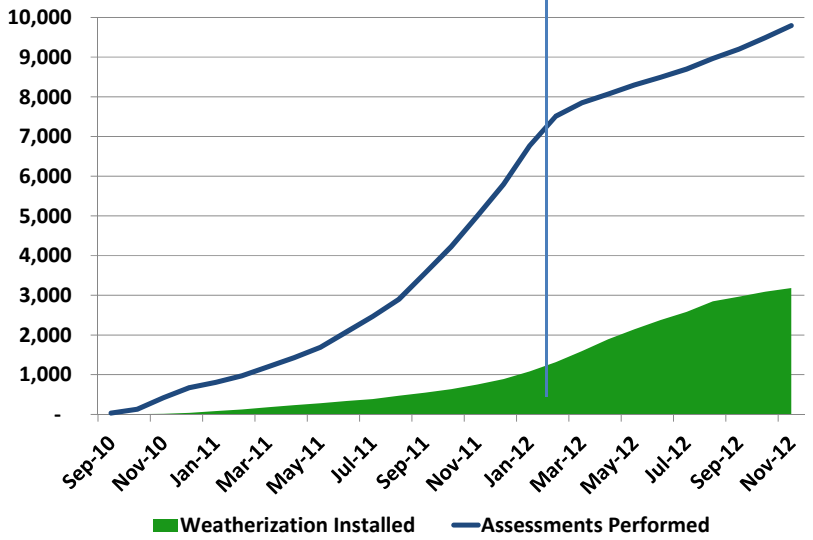


Figure A-7: Cumulative Assessments and Weatherization



c) Renew Boston's contractor, Next Step Living, has been reporting program activity to the City on a monthly basis. The NSL "waterfall" charts on this page show the cumulative results through November 2012.

- The chart below includes all participants.
- The arrows illustrate the impact of audits with "no opportunity" on the weatherization rate.

The second waterfall chart includes only households in three-family buildings, showing that:

– "no opportunity" is found slightly more often,

– weatherization is done less often, highlighting the need for greater assistance for 2-4 unit buildings, which is discussed under Initiative 4, points 5 and 6 (Figure R-27).

– Further information on 2-4 family buildings is also presented below in section 7 of this Appendix, and under Residential Initiative 2, point 5 (Figures R-19-20).

Figure A-8: Results of All Assessments by Next Step Living

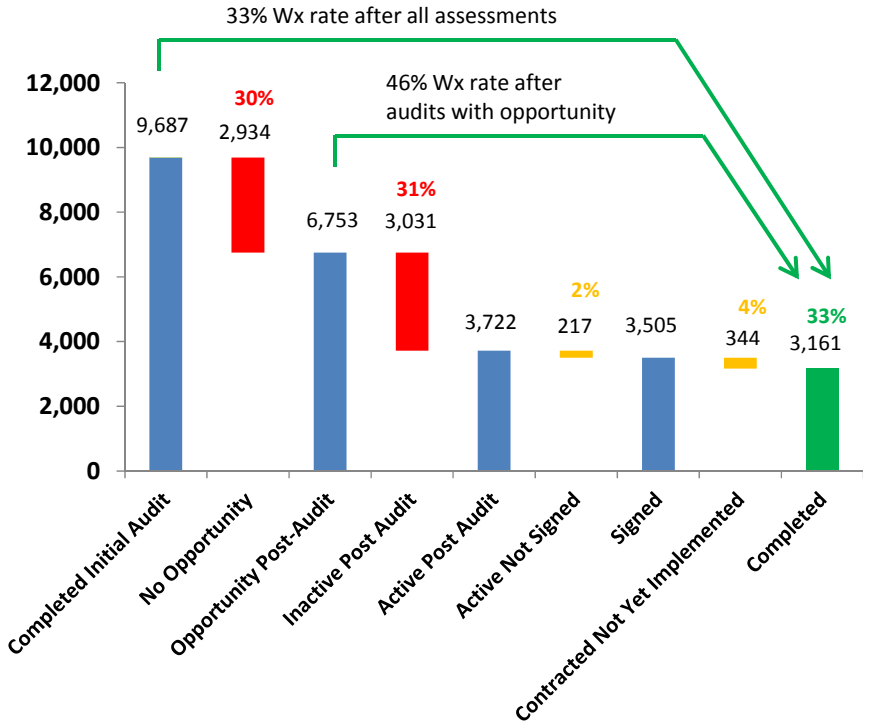
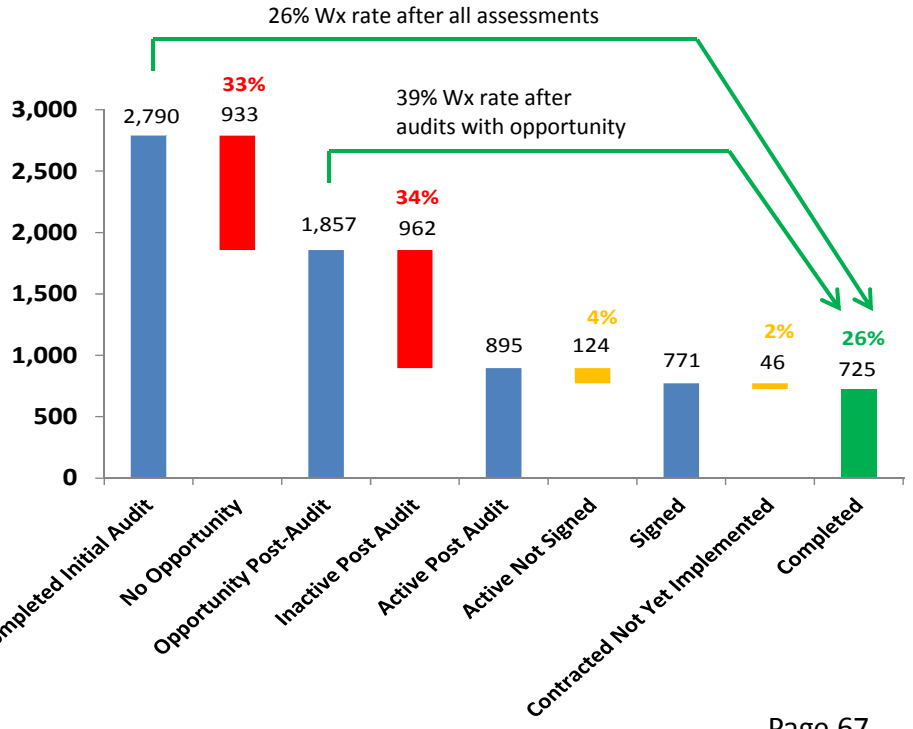


Figure A-9: Results of Assessments in Three-Family Buildings



d) The Goodman Report provides additional information on the extent to which assessments have yielded weatherization, by gathering information on partial implementation.
   - Of the 289 households in its survey for whom their Home Energy Assessment (conducted from July 2010 to April 2012) included recommendations, 44% (128) stated that they "expect that all of the work from [the] assessment will have started by October 2012" (3 months after the survey), and
   - another 27% (78) expect to start at least one measure,
   - for a total of 71% expecting to take action (page B3).

e) The Goodman survey also found that a very large number of respondents "plan" to implement more measures "later." (See Figure R-26 under Residential Initiative 4 for the source of this conclusion.)
   d) This is a strong argument for developing an approach to track customer actions carefully so the outreach campaign can follow up at a later time with those who have remaining opportunities.

6. Monthly Levels of Participation in Renew Boston

a) The Renew Boston campaign has had 4 phases:

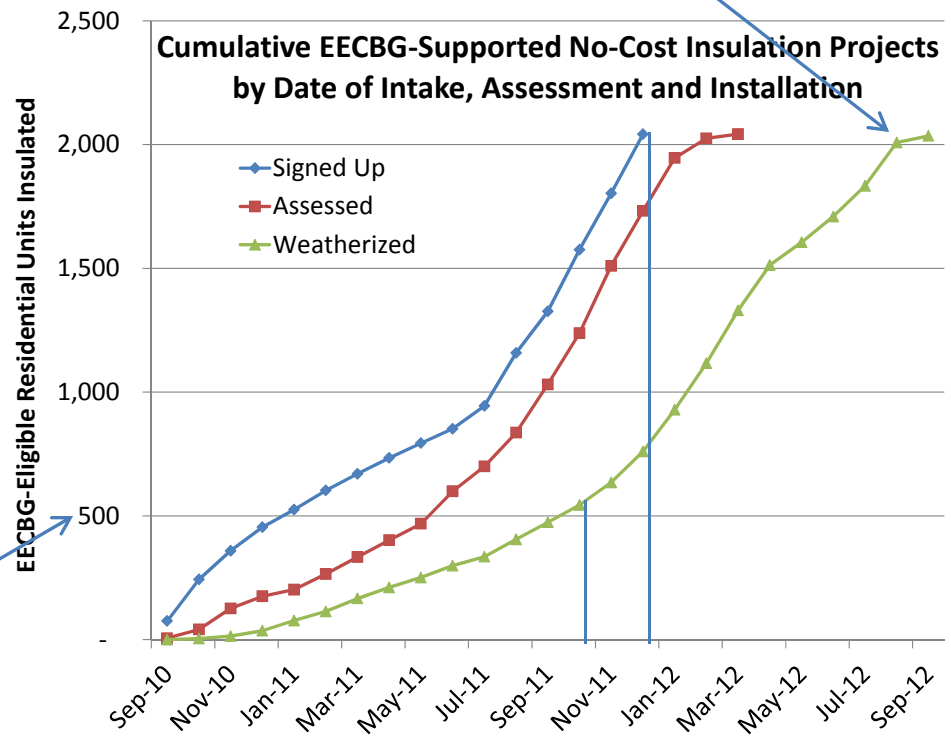
1. Initial Outreach and Start-Up Period
2. Outreach Ramp-Up and Rush to the Deadline
3. Post-Deadline Focus on Delivery
4. Initiation of Renew Boston 3.0 Outreach.

b) Approximately 2,260 families received EECBG funds through Renew Boston to supplement the standard Mass Save incentive, which usually pays 75% of the cost of insulating a home (up to some limits), by paying for all (or in some cases, most) of the customer "co-pay."

c) The chart in Figure A-10 tracks the first 2,042 of these families over time as they signed up (top blue line), and then had their Home Energy Assessments (red line with squares), and finally had the insulation work done (right-hand green line).

- For the prospects who signed up during the first several months after the Renew Boston campaign kicked off in September 2010, it took several months before Assessments were completed for all of them, but by mid-2011, the audit infrastructure had "caught up" with the outreach.
- Approximately 500 of these families had been insulated before the beginning of the heating season in the fall of 2011.
- It took until August 2012 until virtually all of these EECBG-qualified customers had been insulated, roughly a two-year period since the beginning of the campaign.

Figure A-10



d) These two charts show participants in the month in which they "signed up" and how many of them eventually followed through to get a Home Energy Assessment or insulation.
   - Prior to August 2011, the intake process was generating roughly 300 Assessments and 100 insulation projects.
   - The number of prospects who signed up during the 5 months before the end of the no-cost offer in December 2011 was very large, raising the question as to whether and how such a level could be achieved in the future on a sustainable basis.
     - This pattern underscores the usefulness of a deadline, with associated messages like "Act now…"

Figure A-11

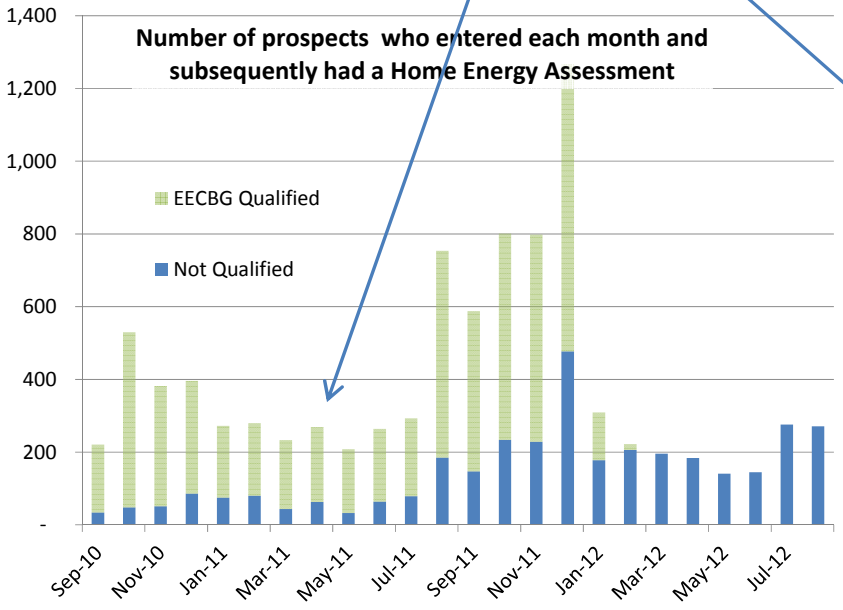
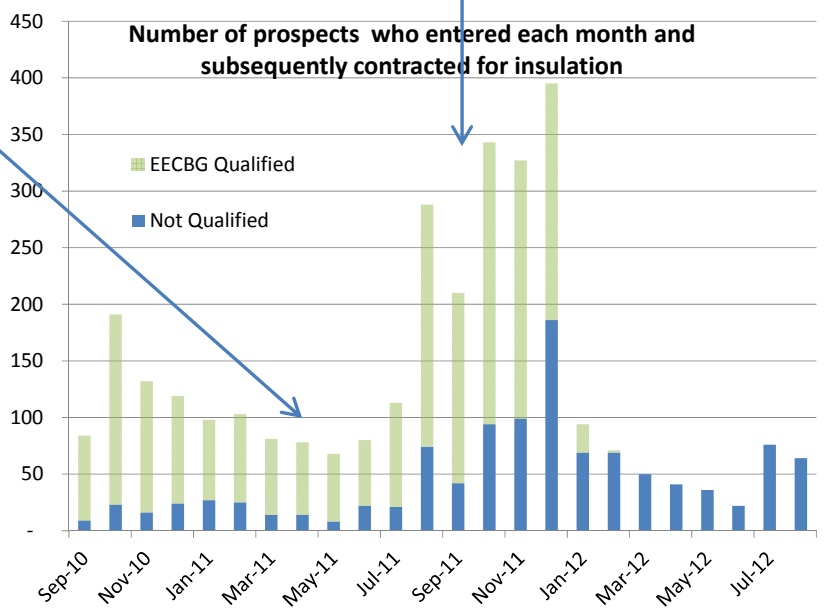
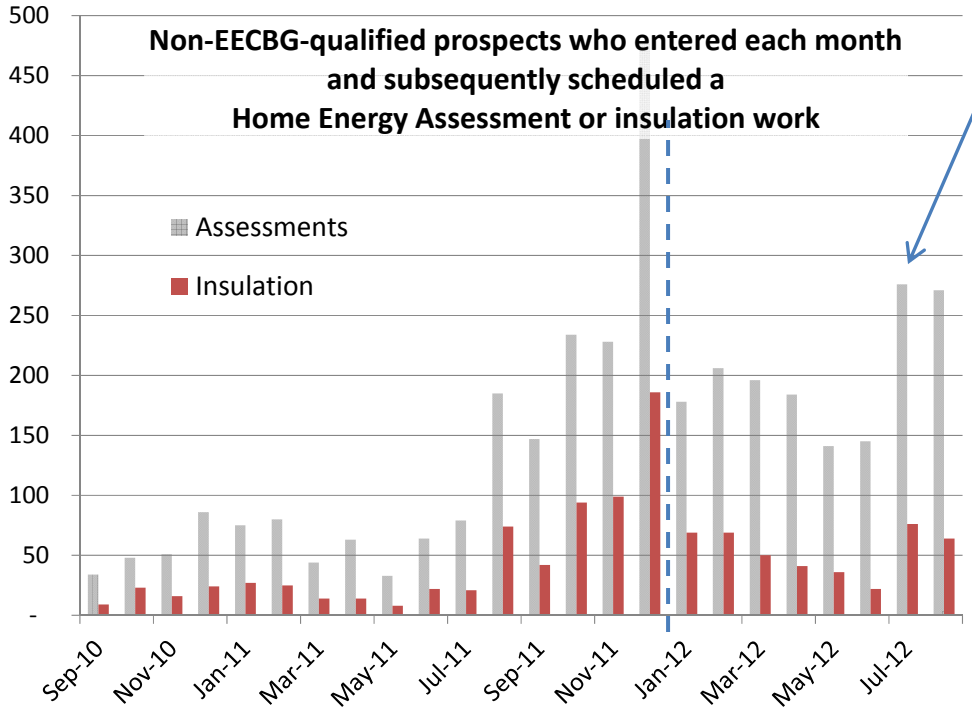


Figure A-12



e) For program planning, one important question for Renew Boston is the number of participants that could be expected on an ongoing basis without the EECBG no-cost insulation offer.
   - The chart below extracts from the previous two charts just the residents who were not eligible for the no-cost offer.

Figure A-13



- No prospects signing up for Renew Boston beginning in January 2012 were offered the no-cost insulation, since the EECBG funding had already been allocated. From January through June of 2012, these residents who signed up (as prospects) had 150-200 assessments per month, but only contracted for insulation at a rate of approximately 50 per month.
- Beginning with intake in July, there was a jump in audits and contracting, as a result of a new wave of Renew Boston outreach (including promotion of Renew Boston Solar).
- Renew Boston will continue to monitor these patterns to develop targets for participation going forward.
  - Initial targets for 2013 are presented under Residential Initiative 4.
  - At the same time, the new whole-building incentive can be expected to substantially impact participation for residents of 2-4 family buildings.

7. Participation of Tenants and Landlords in 2-4 Family Housing

- The Renew Boston strategy has been and will continue to be to focus on serving tenants and landlords, to overcome the split-incentive and other barriers for 2-4 family buildings.
- Figure A-14 below shows that a significant number of homes have been insulated even in these two and three-unit buildings, despite the higher single-family participation. (Note: charts on this page omit homes for which ownership was unknown.)
- Nevertheless, tenants and residents in 2-4 family buildings had their homes insulated at substantially lower rates, as a percentage of home energy assessments where there was an opportunity for weatherization, than did single-family homeowners, as illustrated by Figure A-15 below (in the middle of the page).
  - The lowest rate of insulation – only 25% -- was among tenants in apartments in three-family homes, highlighting the need for continuing assistance as discussed under Initiative 4 below.
- A similar conclusion was reached in the Goodman Report, which found the same pattern for both full and partial implementation of the recommendations from the assessment, as shown in Figure A-16 below.

Figure A-14

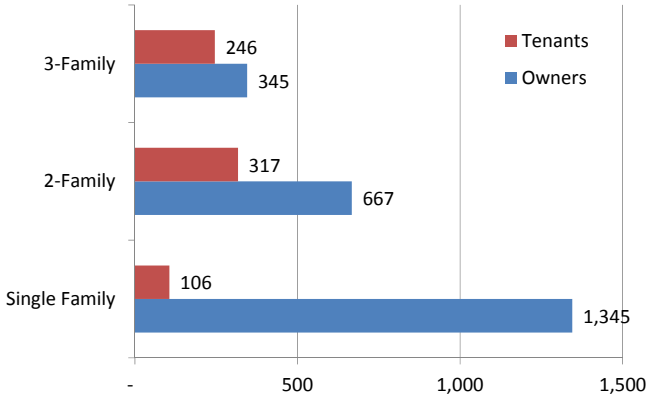


Figure A-15

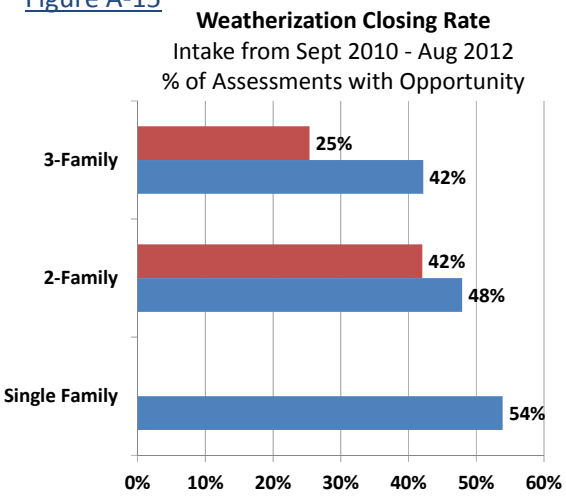


Figure A-16