

## DEFINITION AND BACKGROUND

This brief provides background, opportunities, and key discussion questions for three initiatives within the Program Administrators’ (PAs’) Whole House Program—Home Energy Services (HES), New Construction, and Behavior/Feedback—to support Council discussion at the workshop on the morning of February 26, 2015. The fourth initiative in the Whole House Program, the Multi-Family Retrofit Initiative, is briefed in a separate document and will be discussed in a separate workshop on the afternoon of February 26, as will the Low Income Sector.

The Residential Overview and Context brief previously provided to Councilors provides general information on savings and benefits for the Whole House Initiatives. This brief provides more detailed information on the HES, New Construction, and Behavior initiatives to support targeted Council discussion and development of recommendations related to these initiatives for the 2016-2018 Plan. The main focus of this brief is the HES Initiative given its relative contribution to savings and benefits accomplishments and the breadth and depth of issues related to program design, delivery, and achievements. While there is a lesser focus on the New Construction and Behavior/Feedback Initiatives, they are important components of the PAs’ Residential Sector program offering and basic information is provided here to give Councilors a complete picture.

## HOME ENERGY SERVICES OVERVIEW

### Initiative Overview

HES is a nationally recognized whole house initiative. Its core elements and lifetime savings results are summarized in Table 1.

**Table 1. Home Energy Services Overview**

Description	Measures and Practices Encompassed by Initiative	% of Savings Lifetime (2013)
In-home energy assessment providing site specific recommendations to improve the energy efficiency of 1-4 family homes using a whole house approach. <sup>1</sup>	<ul style="list-style-type: none"> <li>• Direct install of no/low cost instant savings measures (CFL and LED lamps, faucet aerators, low-flow shower heads, advanced power strips).</li> <li>• Consumer education via house as a system approach (thermal envelope, mechanical equipment and plug load).</li> <li>• Creation of a site-specific home energy report.</li> <li>• Turn-key weatherization services provided by participating, qualified contractors (e.g., weatherization, air sealing).</li> <li>• Cross promotion of electric and gas products offerings.</li> <li>• Early boiler and furnace replacement.</li> <li>• Access to non-regulated fuel (e.g., oil, propane) heating/hot water rebates.</li> <li>• Access to 0% HEAT Loan financing.</li> <li>• Cross promotion of all available/applicable rebates/incentives.</li> </ul>	<p>16% Electric</p> <p>42% Gas</p> <p>57% Total Benefits</p>

<sup>1</sup>Income eligible customers (customers on the discount rate) are served through the Low Income program. The Multi-Family Retrofit Initiative serves buildings with 5+ units.

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### HES OFFERINGS

The PAs strive to offer a whole-house approach to each customer through HES. The HES home energy assessment objective is to provide customers with the opportunity to understand the impact of all major energy efficiency measures and improvements that can be implemented in their homes. Energy Specialists perform an assessment of all energy efficiency opportunities including thermal measures, heating equipment efficiency, combustion safety, a screening of the existing refrigerator, cost-effectiveness of major measures, and installation of instant savings measure opportunities. They also seek to identify all health, safety and indoor air quality issues. The use of infrared thermography, as well as the installation of efficient lighting (CFLs or LEDs, as appropriate), domestic hot water instant savings measures, programmable thermostats/wireless enabled thermostats, and advanced power strips are required offerings during home energy assessments, as applicable. The educational process is meant to motivate customers to implement major measures.

Table 2 details the measures resulting in savings claimed directly via the HES initiative, as well as the delivery mechanism for those measures.<sup>2</sup>

**Table 2. HES Measures**

Measure	Incentive Type	Delivery
LED & CFL ENERGY STAR <sup>®</sup> Bulbs	Instant Savings Measure	Installed During Assessment
Low Flow Showerheads	Instant Savings Measure	Installed During Assessment
Faucet Aerators	Instant Savings Measure	Installed During Assessment
Advanced Power Strip	Instant Savings Measure	Installed During Assessment
Programmable Thermostat	Instant Savings Measure	Installed During Assessment
Insulation	Instant Incentive	IIC or HPC Complete HES Approved Work Scope
Air Sealing	Instant Incentive	IIC or HPC Complete HES Approved Work Scope
Refrigerator Early Retirement	Rebate	Screened and Recommended During Assessment
Efficient Heating Equipment	Rebate <sup>3</sup>	Screened and Recommended During Assessment
Domestic Hot Water Equipment	Rebate	Screened and Recommended During Assessment
Weather Responsive Controls	Rebate	Screened and Recommended During Assessment
Early Boiler Replacement (Oil, Propane)	Rebate	Screened and Recommended During Assessment
Early Furnace Replacement (Oil, Propane)	Rebate	Screened and Recommended During Assessment
Wireless Enabled Thermostat	Rebate	Recommended During Assessment

<sup>2</sup> A home energy assessment may also include measure recommendations for which costs and savings are tracked in other residential initiatives, such as the gas Heating & Water Heating Initiative.

<sup>3</sup> Rebates for oil and propane equipment and thermostats are provided directly through HES. Electric and gas equipment incentives (aside from early replacement noted separately) are offered through the separate electric and gas heating initiatives, but recommended during the home energy assessment.

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### DELIVERY CHANNELS

Beginning in mid 2011 the HES delivery model was redesigned in order to incorporate more of an open market model and integrate additional market actors. HES is delivered via PA Lead Vendors (LVs), as well as participating Home Performance Contractors (HPCs) and Independent Installation Contractors (IICs). Table 3 provides a high level overview of the HES delivery channels.

**Table 3. HES Delivery Channels**

Function	Function Performed By		
	Customers call Mass Save and LV allocates projects to contractors	Customers call contractors or contractors find projects through their own means	
Call Center Intake, Contractor Coordination, Data Management, Other	LV	LV	
Home Energy Assessments	LV	LV	Home Performance Contractors (HPCs)
Weatherization Measure Installation	Independent Installation Contractors (IICs)	Independent Installation Contractors	
Quality Assurance	Statewide Quality Assurance/Quality Control (QA/QC) Vendor and/or Lead Vendor		

LVs and HPC are compensated a “base rate” for each home energy assessment performed. In addition to being compensated for the energy assessment, additional installation fees are paid for the installation of instant savings measures such as a fee per no-cost bulb installed and thermostats. The LV allocates all resulting weatherization work scopes to participating IICs, while HPCs provide these services directly to customers generating an additional revenue stream. HPCs also have the opportunity to expand their offering to include any other Mass Save® eligible measures (e.g., efficient heating/cooling). Some PAs have also instituted a performance bonus to be earned by those HPCs who consistently meet key performance indicators (e.g., conversion rates, ISM installation rates, high quality of work/customer service).

### TRACKING AND REPORTING

Currently, the costs, savings, and benefits of weatherization improvements, Instant Savings Measures (light bulbs, etc.), and oil and propane heating system improvements resulting from a home energy assessment are attributed to the Home Energy Services Initiative. If the auditor determines that a gas or electric heating system or water heating system upgrade may be appropriate, the customer is provided with a recommendation and rebate form for GasNetworks or COOL SMART®. Any subsequent system improvement resulting from this

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recommendation is credited to the separate electric or gas heating and cooling initiative within the Residential Products Program. Traditionally, the PAs' tracking and accounting systems have not supported assessment of cross-initiative participation. The result has been that the full costs, savings, and benefits from a home energy assessment cannot be rolled up into a single number. As a result of discussions on how to address this in 2014, the PAs worked with their rebate processing vendor to code 2015 rebate forms and update their online rebate applications to link heating and hot water system replacements to a home energy assessment.

### Initiative Highlights

#### **INCREASE IN LED DIRECT INSTALL**

In early 2014 the PAs recognized the opportunity to increase the level of LEDs being installed via HES as a result of decreasing costs and collective statewide buying power. LEDs delivered via HES cost more than retail/upstream incentives. The PAs released a collaborative Request for Proposals to bulk procure a wide variety of LED options. The statewide contract was awarded in mid-2014, resulting in an expeditious and significant increase in the installation of no cost LEDs in the HES program (the same is true for all residential initiatives (New Construction and Multi-Family Retrofit as well as Low Income Sector) offering direct install of lighting). The 2013-2015 plan initially proposed increasing LED direct installs from one bulb per energy assessment in year one to three bulbs in year three. As a result of a lower than expected cost per bulb through the PAs' bulk procurement effort and falling LED prices, LEDs made up 60%, or an average of 12 LED bulbs installed per home energy assessment, by December 2014. The PAs included an option for pricing review every six months in the statewide contract, which is expected to increase the opportunity to capitalize on changing LED prices. The PAs will experience a further reduction in LED prices in early 2015 as a result of this negotiated contract element.

#### **EARLY HEATING EQUIPMENT REPLACEMENT**

The Early Boiler Replacement rebate launched in 2012 and offered customers up to \$4,000 when they replaced a functioning boiler that was at least 30 years old. The offer was designed to incentivize customers to purchase high efficiency heating equipment earlier than they would have normally considered the investment. Marketing and outreach focused primarily on the HVAC community, where the PAs already had strong relationships through the gas heating program.

Because the Early Boiler Replacement rebate was so successful, the scope of the effort expanded to include furnaces and air conditioning in 2014. The Early Heating Equipment Replacement rebate has become a staple of Mass Save and complements the standard heating equipment rebate offerings.

Customer participation and system replacements have steadily grown as customers and HVAC contractors have become more aware of the rebates. This growth is illustrated by a greater than 110% participation increase from 2012 through 2014.

#### **EFFICIENT NEIGHBORHOODS + (EN+) AND RENEW BOSTON**

EN+ was developed in 2013 in an effort to enroll "hard to reach" customers with incomes at 61%-100% of state median household income, as well as promote whole building retrofits in 2-4 unit buildings. The PAs hired Opinion Dynamics Consulting to develop target census block groups within Massachusetts that met the PAs' requirements of having a high propensity of "Hard to Reach" and a high concentration of 2-4 unit buildings.<sup>4</sup> EN+ was delivered in four entire cities or towns and 37 census blocks in 2013. EN+ participants were recipients of enhanced incentives and targeted marketing and outreach tactics specific to each community, including joint messaging with Town officials and local stakeholders. EN+ continued in 2014 with new target census blocks (52 Census blocks and two entire towns). A second EN+ evaluation is being completed on EN+ results from those communities. Table 4 provides a list of the enhanced EN+ incentives.

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<sup>4</sup> The process of selecting targeted communities is described in the 2013 evaluation of the EN+ initiative: <http://ma-eeac.org/wordpress/wp-content/uploads/Efficient-Neighborhoods-Plus-Initiative-Evaluation-Final-Report1.pdf>, p. 16.

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Table 4. Enhanced EN+ incentives

Measures	Efficient Neighborhood + Enhanced Incentives	Standard Home Energy Services Program Incentives
Common Area Lighting	LEDs/CFLs	N/A
Lighting	LEDs/CFLs	LEDs/CFLs
Weatherization	90% up to \$3,000	75% up to \$2,000
Whole House Weatherization Bonus	\$500	N/A
Early Refrigerator Retirement	\$200	\$150
Early Boiler Retirement	Up to \$4,000 (extended timeframe)	Up to \$4,000
Early Furnace Retirement	Up to \$1,000 (extended timeframe)	Up to \$1,000
Enhanced Furnace Rebate	Additional \$100	N/A
Early AC or Central Heat Pump Replacement	Up to \$1,000 (extended timeframe)	Up to \$1,000
EN+ Whole House Incentive Adder Package Insulation + Heating Equipment	\$500	N/A

Renew Boston was designed to boost energy efficiency and alternative energy for residents and businesses in the City of Boston. Renew Boston launched its residential energy efficiency services with a limited-time no-cost offer for air sealing and insulation (up to \$2,000) for moderate income households (61%-120% of state median household income). For this initial offering, the City of Boston provided the 25% customer cost share for weatherization. In June 2013, Renew Boston began offering a “Whole Building Incentive” for 2 to 3-unit buildings. The Renew Boston Whole Building Incentive targets landlords, renters, and condo owners by offering enhanced energy efficiency incentives when all eligible units receive recommended upgrades. The primary offering is 90% off insulation up to \$3,000 for each unit. Lessons learned from EN+ and Renew Boston will be used in the development of the 2016-2018 3-Year Plan.

#### HPC AND IIC PARTICIPATION

HES has two categories of participating contractors: Independent Installation Contractors (IICs), who perform weatherization work that is specified by the Lead Vendor; and Home Performance Contractors (HPCs), who conduct outreach and are able to provide home energy assessments and HES incentives to their customers. Since 2012 both the IIC and HPC networks have grown steadily; the IIC network has over 90 participating companies (~55% growth) and the HPC network has over 20 companies (~90% growth).

IICs have all the appropriate credentials and certifications to perform the installation of weatherization measures. These contractors are awarded work based on their performance levels via a Merit Based Work Allocation mechanism. The premise is that contractors performing the highest quality work with the highest customer satisfaction levels are awarded with a higher volume of weatherization work orders. This has the benefit of raising the overall bar for performance as contractors strive to earn a higher volume of work. PAs believe that rewarding contractors who provide high quality work and customer service has been instrumental in increasing the weatherization work quality. For example, after three years of having the Merit Based Work Allocation system in place, Eversource and National Grid have seen 2/3 of IICs achieve the top tier ranking, even while raising standards by ~10%. The PAs’ robust quality assurance protocols provide the required data to manage such a system while monitoring opportunities to improve the customer experience.

HPCs perform both home energy assessments and the installation of weatherization measures. They are required to maintain broader levels of certifications and credentials since they have a larger scope of work. Customers that work with an HPC have the opportunity to receive their home energy assessment, weatherization improvements, and potentially other services, from the same vendor. As part of the PA’s robust

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quality assurance programs, the PAs measure and report to HPCs the impact they are having on the initiative. To foster ongoing improvements with the HPC quality of work, some PAs have provided incentive structures that reward HPCs that are consistently high performers, aligning their performance with the goals of HES.

#### **BEST PRACTICES WORKING GROUP (BPWG)**

As part of the PAs commitment to ongoing communication with our partners, an HES Best Practices Working Group was established in 2011. The group meets monthly and serves as a forum to provide an open line of communication between participating HES HPC's, IICS, LVs and PAs. The objective is to discuss relevant topics to drive positive change.

Some highlights of enhancements made over the past couple of years as a result of the BPWG include:

- Introduction of fully/highly subsidized marketing materials for use by participating contractors
- Formal pricing review process resulting in several price increases (e.g., measure level, such as fiberglass and overall increase)
- Additional training and workforce development subsidies (revised Q4 2014)
- Collaborative discussions with organizations such as Mass Labor and Workforce Development
- Development of performance standards
- Customer survey review and standardization
- Introduction of the Mass Save Partner logo
- "Walk in my shoes" opportunity for Energy Specialists and IICs

#### **INCREASED WEATHERIZATION CONVERSION RATES**

PAs have defined conversion rate as the percentage of customers who have an energy assessment and move forward with air sealing and/or insulation work. PAs are well aware of the importance of having a high weatherization conversion rate, and the impact it has on the overall cost-effectiveness of operating the HES Initiative. They also realize the complexity of dealing with the Massachusetts housing stock, seasonal influences on weatherization, and the schedules of busy residential customers. The PAs attempt to counteract these issues through their marketing efforts and their relationships with LVs and HPCs; this topic has been a staple for discussion at nearly every meeting between PAs, LVs, and HPCs. The PAs also offer a recurring promotion each year (i.e., Spring and/or Summer) during which a "bonus" is offered to customers with expired contracts who decide to move forward with weatherization work. This is an attempt to help smooth out seasonal demand so participating IICs have a continual stream of work. Since 2012, HES has seen the overall impact of these and other efforts result in a program conversion rate increase of approximately 10% or ~35% of energy assessments resulting in the installation of weatherization measures.

#### **MASS SAVE HEAT LOAN**

The Mass Save HEAT Loan, originating in 2006 via legislation (which has since expired), offers residential customers a cost-effective way to finance the out-of-pocket costs of installing high efficiency, energy saving measures in their homes. The landscape of the Mass Save HEAT Loan has evolved significantly over the past three years; the implemented changes have coincided with increased participation, as well as increases in the average loan size per customer and the average number of measures financed per loan.

In 2012, the loan expanded eligible measures to include high efficiency cooling equipment, including central AC, air source heat pumps and ductless mini-splits. From 2012-2014, almost 16% of customers statewide financed some type of AC, putting that measure second only to heating equipment at 63% of customers statewide. Also in 2012, financing for pre-weatherization barriers was introduced, providing customers the financial encouragement to clear roadblocks and proceed with weatherization work. In 2014 the HEAT Loan introduced caps of \$10,000 for central AC, as well as windows. These measure caps prevent one measure from exhausting the \$25,000 maximum loan total and help to control costs. As a result, an increased number of customers finance more than one rebate eligible measure per loan.

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The “Expanded Loan” funded by a one-time allocation of \$4 million by DOER became available to customers in early 2014. The Expanded Loan is a statewide initiative, which builds on the existing HEAT Loan administration infrastructure to expand the interest buy-down measures to:

- A. Allow 2-4 unit property owners to finance up to \$50,000 of work
- B. Offer financing up to \$50,000 for Deep Energy Retrofits
- C. Add biomass wood pellet boilers as an eligible measure
- D. Provide pre-weatherization barrier mitigation grants for knob & tube wiring or asbestos insulation removal in conjunction with the installation of weatherization and heating upgrades

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### POTENTIAL HES OPPORTUNITIES FOR 2016-2018 PLAN

The Consultant Team has identified the following potential enhancements to the Home Energy Services Initiative:

- **Increasing depth of savings.** According to the PAs’ preliminary 2014 results, there were more than 80,000 gas and electric participants (i.e., home energy assessment) in the HES Initiative. While the PAs are using a variety of means for achieving deeper savings from each home energy assessment, there are additional opportunities for adding to successes in this priority area. These include taking steps to increase the number of installed measures vs. recommended, providing additional flexibility to customers and their contractors to achieve deeper savings through custom approaches designed to achieve a specific performance level rather than using a list of prescriptive measures, and expanding deep energy retrofits<sup>5</sup> (currently only offered by National Grid) to a statewide offering.<sup>6</sup> In addition, tracking methods to capture PAs’ existing efforts to achieve deeper savings through heating system replacements should be implemented.
- **Increasing services to moderate income customers, especially renters.** As noted above, the PAs launched the Efficient Neighborhoods+ initiative in 2013 to target moderate income customers (owners and renters) in nine communities (core initiative plus Fall River) and all of Cape Cod due to a modified program design from Cape Light Compact. EN+ was offered at a similar scale for 2014. According to the evaluation of the 2013 initiative, EN+ increased assessments, projects, and savings above standard HES. Once the evaluation of the 2014 effort is complete (it is currently under way), the PAs will be in a stronger position to assess whether EN+ should be scaled up to serve a larger number of communities and customers or whether a revised program model should be deployed. For example, the 2013 EN+ evaluation found that only four percent of EN+ participants were renters despite the fact that 25 percent of customers in the treatment communities were renters. The rate of renter participation in the larger HES Initiative is not known because all of the PAs do not collect information on ownership status.
- **Providing new and/or revised measures or practices:** The HES background above shows that the initiative already includes a large number of measures and practices. Based on public comment at the Council’s January 20, 2015 public hearing and DOER’s experience with the Home MPG pilot, it would appear that the insulation measure (cap level and incentive) is one that the PAs should consider revising (raising the cap and/or revising the incentive) for the

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<sup>5</sup> A deep energy retrofit (DER) is typically defined as a whole-building analysis and construction process that achieves much larger energy savings than those of simpler energy retrofits and is often tied to a home improvement project that includes major roof, exterior siding, or basement work. Information on National Grid’s DER program is available at <https://www1.nationalgridus.com/DeepEnergyRetrofit-MA-RES?ng=us>.

<sup>6</sup> The PAs launched Deeper Energy Measures (wall insulation, cathedral ceiling insulation, and insulation of floor over garage) statewide at the end of 2014.

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next Three-Year Plan. Other measures and practices that may offer promise include duct sealing (currently only offered through Cool Smart) and offering cold climate heat pumps as early equipment replacement options for homes heated by oil or propane contingent on revisions to the RCS regulations and evaluation for cost effectiveness.

- **Continuing to refine the market-based program delivery model:** The program restructuring that brought Home Performance Contractors (HPCs) and Independent Insulation Contractors (IICs) into Mass Save is maturing after an initial learning curve. The 2016-18 Plan offers an opportunity for the PAs to build on their work to implement contractor performance criteria (an area also addressed in DOER proposed RCS regulation changes), address matters related to workforce development such as the ability to attract quality workers raised by contractors at the January 20 public hearing, and ensure that customers are consistently receiving recommendations addressed to their best interests rather than the contractors'.
- **Continuing to assess and refine the HEAT Loan offering:** HEAT Loans technically fall within the PAs' Hard-to-Measure Program rather than Whole House but are an important tool for homeowners seeking to pursue improvements recommended in a home energy assessment through HES. In 2014 there were more than 11,000 HEAT Loans with a total value of almost \$110 million. In 2013 the PAs spent \$13.9 million total or \$1,500 per loan on average to buy down the interest rate to zero percent. A HEAT Loan Process Evaluation is currently underway and may include findings that the PAs should address in the 2016-2018 Plan. Other issues that merit assessment include methods for financing improvements for customers that do not qualify for the HEAT Loan, examination of whether zero percent is necessary for securing customer investment, and a review of included measures (particularly as DOER funding is not expected to continue) and allocation methods for savings and costs.
- **Providing home energy scoring:** Providing a customer with an energy rating/performance score for their home provides them with a clear benchmark for improving their efficiency rating through implementation of recommended efficiency measures. The practice of home scoring/rating has been gaining traction among program administrators in recent years, supported in part by a concerted focus by the U.S. Department of Energy to develop a nationally consistent Home Energy Score. In Massachusetts, home scoring was a component of the Home MPG pilot administered by DOER with American Recovery and Reinvestment Act funding in Springfield. Some auditing software provides the ability to generate a home score with an audit report.

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### KEY QUESTIONS, HES

- **Deeper savings:** What approaches to achieving deeper savings (e.g., deep energy retrofits, improving percentage of installed vs. recommended measures, testing a comprehensive/customized approach to savings) offer the best opportunities for increasing depth of savings in a cost efficient manner while providing a high quality experience for the customer?
- **Moderate income customers and renters:** How could/should efforts to serve moderate income customers be revised and expanded to a larger scale in the 2016-2018 Plan? How can renters in particular be more effectively reached and served?
- **New measures and practices:** What revised or new measures or practices should be considered for inclusion in HES for 2016-2018?
- **Home energy assessment:** How can we make the most of the home energy assessment opportunity (e.g., by providing clear energy scorecards and fuel neutral heating system recommendations to customers) while at the same time avoiding overburdening the auditor and the customer?
- **Delivery model:** Are there continued refinements to the contractor-based program delivery model that would be beneficial to the PAs, contractors, and customers?

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- **HEAT Loans:** Are there further enhancements or modifications to the HEAT Loan offer that should be considered for 2016-2018?
- **Coordination and deeper savings:** How can Whole House and Products Programs efforts be better coordinated to promote efficient products and encourage their proper installation in existing homes, including expanding early replacement opportunities, and support a more complete accounting for achievement of deeper savings?

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## NEW CONSTRUCTION OVERVIEW

The PAs strive to increase the construction of energy efficient market rate residential buildings that exceed the state's energy code through the of the Massachusetts Residential New Construction initiative ("RNC"). Recently, the PAs received the 2014 ENERGY STAR® Certified Homes Market Leader Award (formerly Leadership in Housing) for these efforts. Working with third-party evaluators, a baseline is established through study findings, including inspections of homes, to establish the User-Defined Reference Home ("UDRH"). From this baseline, the initiative has historically set tiers that provide greater incentives as the improvement over baseline gets higher. In 2013 the RNC initiative contributed 3% of the PAs' lifetime Residential Sector electric savings and 11% of lifetime gas savings.

The PAs utilize the Home Energy Rating System ("HERS") infrastructure. The PAs also provide ongoing training and education opportunities for builders. Because of the nature of the HERS, the incentives provide a whole-building approach to the market, as well as provide incentives that coordinate with GasNetworks and COOL SMART® to provide a one-touch solution. The initiative addresses three key markets:

### 1. Low-Rise New Construction - Prescriptive Offerings

There are currently two prescriptive offerings that provide incentives of \$1,250- \$7,000 per unit for single family homes and between \$550-\$4,000 for multi-family units. These were designed to capture the units that follow the prescriptive path of the state's energy code. The Tier II prescriptive option also includes enhanced envelope levels.

### 2. Low-Rise New Construction – Performance Offerings

There are currently three performance offerings that provide incentives of \$750- \$7,000 per unit for single family homes and between \$350- \$4,000 for multi-family units. These all require compliance with the ENERGY STAR Thermal Enclosure System Rater Checklist or Thermal Bypass Checklist, as well as at least 15, 30, or 45 percent energy savings over the UDRH.

### 3. Multi-Family High Rise Construction (for projects 4 stories or greater)

This effort began as a pilot within the last three-year plan. It was created as a comprehensive offering with residential and commercial incentives for applicable high rise buildings. Each project is incentivized based upon the energy savings achieved. There are two paths for participation.

- The Residential In-Unit Prescriptive Option offers incentives for in-unit measures such as appliances, lighting, lighting controls, infiltration, ventilation, domestic hot water usage and in-unit domestic hot water production.
- The Whole Building Prescriptive Option offers incentives for the in-unit measures mentioned in the Residential In-Unit Prescriptive Option plus building envelope, common area lighting and lighting controls, and systems serving the whole building, including motors, drives, domestic hot water and heating, ventilation and air conditioning.

Over the past few years, since the housing downturn in 2007-2008, the number of new construction units has gradually increased to a rate of around 15,000 units/year. In this process, we have seen several notable shifts in the Massachusetts new construction market. Two of the most notable have been:

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- The shift from single-family to multi-family units. With 2014 expected to be the first year where multi-family units account for more than 50% of the new construction market.
- The shift from prescriptive to performance based energy code compliance in residential new construction. 2013 was the first year in Massachusetts where performance based compliance (using HERS ratings) surpassed the number of units using ResCheck (a prescriptive path with minor trade-offs) and the once dominant basic prescriptive path dropped to the 3<sup>rd</sup> most common choice for new construction.

### Light-Emitting Diode (LED) Bulbs

In 2014, the PAs introduced LED bulbs as a new offering, and they were well received by both HERS raters and participants. These were offered at no-cost to the participants with no cap on the number of bulbs installed. In its first year of implementation, there were almost 29,000 bulbs installed throughout the state. The PAs will continue to offer these bulbs at no-cost in 2015.

### Codes and Standards

Over the years, the RNC initiative has had a very high spillover rate for non-participants. In the January 2014 *Massachusetts Residential New Construction Net Impacts Report*, there is a clear indication that the RNC initiative has a dramatic effect on building practices due to the emphasis on quality insulation installation trainings. These results were helped by the broad stretch energy code adoption in MA and state sponsored energy code and best practices trainings offered from 2010-2013. With the passage of the *Green Communities Act*, the Commonwealth is now required to adopt the International Energy Conservation Code (“IECC”) and updates within one year of each revision. Updated PA sponsored trainings (beginning late in 2014) across the state focus on changes to the codes, including a residential overview, HVAC and indoor air quality, and envelope and building science in the residential sector. There are also commercial trainings starting in 2015.

These trainings, as well as ongoing account management, aid builders and trade allies to meet or exceed codes as they change over the years.

The 2012 IECC (the current code) is roughly 25% more energy efficient in our climate zone than the base energy code in 2006. It is anticipated that the 2015 IECC (the code in place for the next three year plan) will be roughly the same for residential construction, except the performance path, and will increase by around 3-5% of commercial buildings.

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## POTENTIAL NEW CONSTRUCTION OPPORTUNITIES FOR 2016-2018 PLAN

New savings opportunities from the New Construction Initiative can potentially come from these program enhancements:

- **Increasing support for zero net energy (ZNE) construction:** The New Construction Initiative at this time does not specifically incent zero net energy construction, though in the past the PAs conducted a contest to recognize ZNE construction efforts. Zero-net energy has become a highly visible and marketable concept in recent years. In 2008, the California Public Utility Commission adopted an Energy Efficiency Strategic Plan with a “Big Bold Energy Efficiency Strategy” that all new residential construction in California will be ZNE by 2020 (commercial by 2030). This is acknowledged to be a “reach” goal, but subsequent efforts, including a “Path to Zero” campaign sponsored by the CPUC, state agencies, utilities, the building industry, and others, have set California on a strong trajectory.<sup>7</sup> In Massachusetts, DOER has recently awarded \$3 million in competitive grants to fund feasibility, integrated design, and construction of zero-net energy buildings

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<sup>7</sup> California Energy Efficiency Strategic Plan, January 2011 Update. [http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan\\_Jan2011.pdf](http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf).

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in Massachusetts through its Pathways to Zero Net Energy Program. The 2016-2018 Plan provides an opportunity for the PAs to pursue complementary, if not coordinated, efforts with those of DOER and others. Specifically, the PAs could:

- Require that new construction receiving PA incentives at at least the highest tier(s) be “renewable ready.” Through the ENERGY STAR<sup>®</sup> for Homes program, the U.S. Environmental Protection Agency has developed Renewable Energy Ready Homes specifications to educate builders on how to assess and equip new homes with a set of features that make it easier and less expensive for homeowners to install solar energy systems after the home is constructed. Program administrators in Connecticut require renewable ready construction for homes qualifying for the highest performance tier.
  - Offer a ZNE incentive tier for the 2016-2018 New Construction Initiative. The PAs already offer several different tiers to serve a variety of interests and needs. In addition to incentives, support, training, and education will support further development of this workforce and could complement the PAs’ existing efforts, including for stretch code compliance.
- **Introducing new technologies:** New homes provide an excellent opportunity for assessment of new technologies. Home automation/home energy management systems and other controls, which could also be linked with grid modernization efforts and serve as platforms for behavior and demand response, merit consideration in particular.

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### KEY QUESTIONS, NEW CONSTRUCTION

- What role could the PAs play in supporting expanded efforts to construct zero net energy homes?
- How should emerging technologies such as home automation and renewables be integrated into residential new construction in Massachusetts?

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### BEHAVIOR/FEEDBACK OVERVIEW

Behavior-based energy efficiency strategies rely on motivations other than financial incentives to influence people’s energy consumption. Behavioral approaches were first offered as pilots by some Massachusetts PAs during the 2010-2012 Plan. The Massachusetts PAs have used several different vendors and approaches to achieving behavior-based savings. In 2014, only National Grid and Eversource claimed behavior savings (both electric and gas), though other PAs are in the process of introducing programs. Both of these companies provide home energy reports (HERs) from the vendor Opower. The HER program prompts energy savings through two primary paths: (1) educational reports (delivered as paper reports or electronically), and (2) online. The HERs detail and benchmark customers’ energy usage and compare it against their past usage and the usage of similar homes in the area. All customers also have the option of opting out of the HER program at any time. According to the PAs’ preliminary 2014 year-end results, there were almost 1,000,000 electric participants and almost 500,000 gas participants in the Behavior/Feedback Initiative. Energy savings from HERs are in the vicinity of two percent.

The PAs are currently only able to claim a one-year measure life for their behavior savings, resulting in the same annual and lifetime savings. After discussions with a variety of behavior program vendors, the smaller PAs have also reported that the initial startup costs for a behavior initiative are proving challenging for their development of a program offer.

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### POTENTIAL BEHAVIOR OPPORTUNITIES FOR 2016-2018 PLAN

New savings opportunities from the Behavior/Feedback Initiative can potentially come from these actions:

- **Behavior program offerings from all PAs:** As a cost effective offering, behavior programs should be offered by all PAs.

## Residential Whole House Brief

### February 26, 2015 Workshop

- **Combining electric and gas reports:** With a focus in Massachusetts on deeper savings and comprehensive approaches to efficiency, customers with different gas and electricity suppliers should ideally receive a comprehensive set of behavior messages and tips addressing all fuel uses. While this strategy will undoubtedly cause logistical challenges for the PAs and their vendors, providing a seamless customer experience should be a priority.
- **Implementing new behavior approaches utilizing new technologies with a view to a larger customer engagement strategy:** The energy efficiency environment is increasingly dynamic and customers draw on a variety of sources of information to make decisions. Opportunities to leverage program investments in technologies like wireless enabled thermostats to deploy behavior messages and achieve additional savings should be investigated with a longer-term view to building a strong customer engagement platform.

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### KEY QUESTIONS, BEHAVIOR

- Should the specific opportunities outlined above be pursued?
- How might PAs' behavior programs most effectively drive participation in their other programs?