



**Massachusetts Residential New
Construction Four to Eight Story
Multifamily Pilot
Interview Findings
*Final***

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Executive Summary

The Four to Eight Story Multifamily New Construction Pilot (Pilot), was introduced in 2010 to address the needs of mid-rise multifamily buildings. The Pilot was designed as a prescriptive program addressing 154 energy conservation measures over seven categories. The aim was to include the most common measures installed at the outset and approve other measures on a case-by-case basis if they made sense. As of the end of January 2012, fourteen projects, consisting of 721 units and 807,962 square feet, had completed participation in the Pilot and received a total of \$523,994 in incentives. The completed projects are estimated to collectively save 1,328 MWh (with 11,181 negative Therms associated with the electric savings) and 52,474 Therms annually. This translates to a total net savings of 8,823 MMBtu a year. An additional ten projects are scheduled to complete by the end of 2012. About 70% of the projects involve affordable housing.

NMR conducted fourteen interviews with the Pilot's sponsors, implementers, and participants with completed projects, examining the Pilot's goals and objectives, the process of signing up and completing verification, outreach and the timing of projects served, the measures covered, the measures installed, barriers to energy efficient multifamily new construction, and satisfaction. Key findings from the interviews conducted include:

- The Pilot's participation process appears to be running fairly smoothly based on the interviews with participants who have completed their projects. Two of the participants interviewed were aware that if the Pilot had not been available, they would have had to go through a very technical process in a commercial prescriptive program without the user-friendly support provided by the Pilot. Participants also appreciated being able to apply for electric and gas incentives in one place.
- The Pilot's goals do not appear to have been particularly well-defined at the outset. As part of the process evaluation, the interviewees posited their perception of what were the program goals. The evaluation team formulated these ideas into a set of goals. One of these goals was to coordinate all residential and non-residential program features into a one-stop process with coordinated support and one incentive application. In general, the process was achieved with a few exceptions, particularly when including HVAC equipment into the mix of equipment applied for.
- Initial outreach relied on developers and consultants in the field who had contacts with ICF, the Pilot's implementer, and word-of-mouth. By the end of the first year, a comprehensive database was in place tracking projects that the design firms and architects working with ICF may have in the pipeline.
- About one-half of the fourteen projects that had completed participation, in terms of square footage, were in an early design stage with the HVAC equipment still under discussion when they learned of and signed up for the Pilot. The timing of these projects

is due to the long development cycle for multifamily new construction, especially for affordable housing. The Pilot ran on a three year cycle while multifamily building runs on a five to six year cycle from start to occupancy. Ideally, program engagement should occur during the conceptual design phase of a new project.

- The Pilot's implementers and participants both pointed out the advantages of a performance-based system. The interviewees thought such a system would allow more focus on emerging technologies such as air source and ground source heat pumps, chillers, HVAC controls, and super-high-efficient envelopes.
- Almost all of the completed projects installed high efficiency fluorescent fixtures, CFL fixtures in the units, occupancy sensors, ENERGY STAR refrigerators and dishwashers, and low flow showerheads. The vast majority also installed high efficiency hot water boilers, efficient windows, and wall insulation. Projects that enrolled in the Pilot could also contract with an approved third-party verifier under the High Performance Building Adder (HPBA) to test the building, including individual units, for air leakage and other performance measures. Most of the projects took advantage of the HPBA and most achieved air infiltration at 7 ACH50. Most of the square footage served also installed some type of heat pumps as well as energy efficient central gas boilers or furnaces. Efficiency measures for tight building envelopes and the use of heat recovery ventilation (HRVs) were offered and most completed projects qualified for incentives that are tied to the use and performance of HRVs. Measures less likely to be installed included boiler reset controls, premium motors and pumps, variable frequency drives, and indirect fired water heaters.
- All of the participants interviewed said they had planned to install essentially all of the measures for which their projects received incentives, before learning of the Pilot. Asked whether they would have installed all the measures credited to the Pilot without the incentives, the participants with affordable rate projects noted that while they did not know of this particular Pilot when they were planning their projects, they all had assumed that there would be some funding to help defray the costs of building energy efficiently. It should be noted that Pilot participants were drawn from a list of active green designers, so the high free-ridership is not unexpected. Future efforts will need to attract projects from designers not currently involved in energy-efficient design and construction.
- The split incentive, that is, the fact that the developer pays for energy efficiency improvements but the unit owners or tenants who pay for their own heat and utilities benefit from lower energy bills, is generally not considered a barrier by participants with affordable rate housing. The most commonly mentioned barrier to energy efficient construction is cost followed by a lack of technical knowledge in a changing field; sometimes there is too much information and decision fatigue. The three market rate developers interviewed tend to believe the split incentive need not be a barrier if the unit's price can reflect its building costs.

- All of the participants interviewed give high marks to the account manager and other staff they worked with in the Pilot for all the projects completed. Overall satisfaction with the experience of participating in the Pilot also was fairly high. Participants were less satisfied with the incentives received though most still said they were satisfied.

The following recommendations are offered based on the findings from the interviews conducted with the Pilot's sponsors, implementers, and participants.

- **Offer a performance-based program for the mid-rise multifamily new construction market, or possibly the entire multifamily market over three stories.** The integral nature of the design for buildings of this size should be taken into account as well as the fact that it gets much harder and more expensive to improve performance as a building becomes more efficient. A performance-based program would also address gaps such as a participant having to go through a different program to cover efficient central chillers.
- **The Pilot's verification of ventilation and infiltration rates for individual units through the HPBA is a positive innovation.** More testing is needed to understand how much energy can be saved by including these measures in multi-family new construction practices. However, given that quality installation of insulation and air sealing have shown to be important in single family structures, the chances are good that similar activities will prove cost-effective for multi-family buildings. The multi-family program should continue to fund and encourage these measures.
- **Offer a long-term program.** Ideally, a program would run for five years and be renewed annually, so that prospective participants know that the program will be in place when their projects complete. With a longer-term program, implementers should focus their efforts on reaching projects at the earliest stage possible.
- **Try to identify and recruit more projects with less of an energy efficiency or green building tilt.** Having a longer-term program in place should allow the implementers to expand their relationship-based marketing focused on the design community enabling them to reach more projects and provide the assistance they need to incorporate higher levels of energy efficiency. It is also important to devote more resources to outreach so that implementers can identify and pursue upcoming projects from different sources, such as the Dodge Reports.
- **Consider offering assistance and support for the design team, especially as more projects with less of a green tilt are recruited.**
- **Consider efforts to address market concerns and misperceptions about energy-efficient building practices.** Participant interviews identified a number of concerns particular to this market, notably that more efficient systems need more sophisticated staffs and training for building operation and that it would be more difficult to obtain replacement parts. The Pilot is developing a database documenting a number of

characteristics of multifamily buildings, such as size and applicable technologies; these data may be used to provide assistance to design teams as well as help design future programs.

- **The goals and objectives for future pilots and programs need to be clearly defined at the outset.** Explicit goals would enable evaluators to better assess how well the effort has met its objectives.

1 Introduction

This report presents the findings from a series of interviews with the sponsors, implementers, and participants of the Four to Eight Story Multifamily New Construction Pilot (Pilot). The Pilot was introduced in 2010 to address the needs of four to eight story buildings that do not qualify for ENERGY STAR certification but are too small for commercial programs. Fourteen interviews were conducted in all including:

- Three interviews with the Pilot sponsors, National Grid and NSTAR
- Two interviews with the Pilot's implementer, ICF, including the project manager and an account manager
- Nine interviews with participants, representing fourteen projects that had been completed by the end of January 2012

The participant interviews were conducted with the contact listed for each project. In two cases, that was the projects' developer; the remaining participant interviews were with individuals providing project management services, including energy efficiency consulting, for developers. The interviews explored several different aspects of the Pilot including:

- Overall goals and objectives
- Relative ease of the participation process, both in applying to the Pilot and following through with the documentation required
- Outreach, how participants learned of the Pilot and the timing of the projects served
- Measures covered
- Selection of the measures installed, including any influence due to Pilot participation
- Barriers to building energy efficient multifamily homes
- Overall satisfaction with the Pilot

Copies of the sponsor, implementer, and participant interview guides are found in Appendices A, B, and C, respectively. Due to the timing of the project completions, these interviews were spread out over more than a year, from November 2010 through January 2012. An interim memo summarizing findings from interviews with the sponsors, implementer and two participants representing three projects was provided to the sponsors in January 2011.

2 Program Status

The Four to Eight Story Multifamily New Construction Pilot was introduced in January of 2010 and is set to expire at the end of 2012. It was designed as a prescriptive program addressing 154 energy conservation measures for multifamily buildings with four to eight stories. Projects that enrolled in the Pilot could also contract with an approved third-party verifier under the High Performance Building Adder (HPBA) to test the building, including individual units, for air leakage and other performance measures. The HPBA was offered as a means to educate builders and developers about building science and building performance issues. Much of the work that was performed by the pilot-approved Third Party Verifiers using building diagnostics to measure compliance against high performance standards was taken from the then developing ENERGY STAR standard for multifamily high rise buildings. Projects that allowed these measurements to be taken qualified for a \$75/unit incentive in addition to the prescriptive rebates provided by the Pilot.

As of the end of January 2012, fourteen projects, consisting of 721 units and 807,962 square feet had completed participation in the Pilot and received a total of \$523,994 in incentives. The completed projects are estimated to collectively save 1,328 MWh (with 11,181 negative Therms associated with the electric savings) and 52,474 Therms annually. This translates to a total net savings of 8,823 MMBtu a year. An additional ten projects are scheduled to be completed by the end of 2012. Given that it expires at the end of 2012, these twenty-four projects are likely to be the only participants in the Pilot. As shown in Table 2-1, more than 70% of projects, units, and square footage involved affordable housing. Plans for affordable housing were moving forward with ARRA funding when the Pilot signing up projects while market rate housing was still suffering from the effects of the recession. In 2012, the mix is shifting to more market rate projects as the market improves and ARRA funds dry up.

Table 2-1: Projects Enrolled in the Multi-Family New Construction Pilot

	Number of Projects	Number of Units	Square Footage
Completed Projects			
Affordable—Rentals	10	581	656,421
Market Rate—Rentals	2	63	66,775
Market Rate—Ownership	2	77	84,766
Additional Projects Scheduled to Complete in 2012			
Affordable—Rentals	7	294	313,036
Market Rate—Rentals	1	202	299,628
Market Rate—Ownership	2	83	92,000
All Pilot Participants			
Affordable—Rentals	17	875	969,457
Market Rate—Rentals	3	265	366,403
Market Rate—Ownership	4	160	176,766
Total Projects	24	1,300	1,512,626
<i>Percent Affordable*</i>	71%	74%	71%
<i>Percent Market Rate*</i>	29%	26%	29%

*The percentages of affordable units and square footage include 20% of units and square footage that are by law reserved for affordable housing in market rate buildings; these are subtracted from the market rate percentages

3 Goals and Objectives

The Pilot's project manager at ICF noted that the objective of the Pilot has been defined as addressing the energy efficiency potential of smaller, four to eight story buildings that do not qualify for ENERGY STAR certification but are too small for commercial programs. But a larger goal is to have the sponsors acquire a comprehensive understanding of multifamily buildings. It is important to see the Pilot as a learning experience. To that end, ICF is developing an Access database documenting a number of characteristics—approximately 150—of multifamily buildings, such as size, and applicable technologies. NSTAR and National Grid are thus collecting as much information as possible about the four to eight story market in order to develop an understanding similar to that which exists for the low rise multifamily market. There is, however, much less data available for this market than for the low rise multifamily market.

The sponsors also see the Pilot as a learning experience noting that its goals are to determine if there are cost-effective techniques and opportunities that can be leveraged for multifamily new construction which could become part of the regular programs with more funding. One interviewee noted that she saw an initial goal being to learn how to measure and capture savings in the mid-rise multifamily market, but now understands an important goal is also to get as much data as possible on these building types. She would like to have more analysis of the raw data generated by the Pilot so that the impact of individual measures on specific buildings could be discerned. She believes some of the information generated by the Pilot could also be applied to taller buildings.

The sponsors also noted a goal of providing one-stop shopping for multi-family projects with the incentives being coordinated between the commercial and residential sectors, electric and gas, and across service territories.

The Pilot's goals do not appear to have been particularly well-defined at the outset. As part of the process evaluation, the interviewees posited their perception of what were the program goals. The evaluation team formulated these ideas into a set of goals which may be summarized as follows:

- Achievement of MMBtu savings and units served based on the available residential budgets;
- Addressing the energy efficiency potential of buildings that are too large for ENERGY STAR certification and too small for the commercial programs;
- Providing the sponsors with a comprehensive understanding of multifamily buildings, including how to measure and capture savings in this market;
- Identifying cost-effective techniques and opportunities that can be leveraged for multifamily new construction by commercial programs; and

- Providing one stop shopping and support to multifamily projects with incentives coordinated between the residential and commercial sectors and between the electric and gas utilities.

Since the Pilot's goals do not appear to have been particularly well-defined, it is difficult to assess from the interviews conducted how well the goals were met. However, comments from many of the interviewees do point to the Pilot being fairly successful at its goal of providing one stop shopping, support, and coordinated incentives to multifamily projects.

4 Participation Process

The Pilot's participation process appears to be running fairly smoothly based on the interviews with participants who have completed their projects. The interviewees were asked about both the information they needed to provide initially and to complete the process and receive the incentives.

4.1 Initial Process

Participants noted that, initially, they had to provide plans, drawings, specifications, and respond to questions the Pilot had on the specifications. Seven of the nine participants interviewed described the process as 'straightforward'. One participant estimated that she put in ten hours from the time she learned of the Pilot until she completed the initial paperwork. While she did not encounter any difficulties, it simply was time-consuming having all her questions answered. However, her project was the one of the first in the Pilot and she thinks the process probably became more efficient. Two other respondents estimated that the initial application took an hour of their time, one respondent estimated it took two hours, another estimated half a day, and the remaining four said the time required was 'minimal'.

Two participants noted that if the Pilot had not been available, they would have had to go through the very technical process of a commercial prescriptive program and would have had to provide information for every measure installed, such as lighting and every piece of HVAC equipment. While participation in the Pilot requires similar information for the measures that are installed and multiple site visits, it is more user-friendly than commercial programs offering one-stop shopping and close support from an account manager. One interviewee believes the Pilot, by being streamlined and user-friendly, captures more savings for the sponsors; when there is a prescriptive program that requires spending hours with consultants filling out forms, mid-rise multifamily developers will not apply if the rebate is not large enough to make up for the extra work needed. Thus, the sponsors will not know about or receive credit even if particular measures are installed.

From ICF's perspective, the initial participation process in a similar program could be improved by providing an interactive project tool that would allow the customer user to enter the measure inputs and see the savings and incentives right away. The account managers would still do the QA and verify the savings when the projects enroll, but having the customers interact with such a tool on their own time where they could, for example, see the thermal benefit of different types of walls for themselves would help educate them on what works to capture energy savings potential. This tool would be especially useful in a program where there are more projects in earlier planning stages.

4.2 Process Completion

ICF notes that completion of the process involves verification that is performed through different avenues for different measures. The HPBA contractor verifies measures in residential units, such as lights and appliances, as well as the ventilation and infiltration rates. ICF collects digital copies of all construction submittal documents directly from the participants for each of the common system measures, such as common area lighting, that are not verified by the HPBA contractor and then a project manager visually verifies each measure.¹ ICF also does verification of the unit measures for projects that do not participate in the HPBA.² The design team could spend several hours or several days providing all the information necessary at the completion of the project.

Savings from each project are basically classified as residential or commercial following the type of meters installed; common areas have commercial meters and pay commercial rates; individual units have residential meters and rates. Both the sponsors and the implementers believe that process makes sense.

The participants had a more mixed response to completing the process in order to receive the incentives. The key tasks³ for the participants are:

- Providing documentation for the measures installed, which may involve obtaining receipts and sign-offs from project contractors, subcontractors, architects, and mechanical engineers;
- Facilitating access to the building and the design team; and
- Coordinating site visits and inspections and making sure the appropriate parties are present.

Interviewees who offered a time estimate said that completing the process took from one to three days of their time. However, they expended that time over a period of four to six weeks.

Six of the nine participants interviewed considered completing the process to receive the incentives to be fairly straightforward and had no major concerns. One of these participants noted that the coordination needed is par for the course whenever a building is finished and control is transferred to the owners.

One of the three participants who ran into difficulties completing the process had installed a Mitsubishi air source heat pump, which is further discussed in Section 6. This involved contacting the mechanical engineer, general contractor, and equipment manufacturer to calculate required ratings and resolve a host of issues. It should be noted that many of the calls and the research were actually done by ICF, in order to have the equipment qualify for the Pilot. The interviewee believes his account manager went beyond the call of duty; he notes that “she really

¹ In mixed use buildings, any commercial measures would be handled by the appropriate program.

² To date, two out of the fourteen completed projects have not participated in the HPBA.

³ For some projects, the HPBA contractor did some of this work.

believes in this stuff.” Though he has been building energy-efficient multi-family homes for a long time, he appreciates the education he got through this process.

Two other participants interviewed had issues dealing with the purchase of CFLs. The Pilot requires participants to provide invoices for the CFLs, which they are supposed to have purchased through EFI. The reason for this is to avoid double dipping; CFLs purchased from other sources are already subsidized and the Pilot is not supposed to offer an incentive to install subsidized CFLs. However, lighting is installed by subcontractors, so the participants (green building consultants) and ICF have to go through the developer to the general contractor to the subcontractor to obtain the invoices. But if the project was bid on a closed book contract, the subcontractor is not obligated to provide the invoices. These participants had not been reached early enough in the building cycle to have the lighting verification requirements explained to them and found completing the process to involve some uncertainty.

5 Outreach and Timing of the Projects Served

Initially, the Pilot enrolled projects by making a few calls to developers and consultants in the field and through word-of-mouth. There were a number of projects that had been held up waiting for funding from the American Recovery and Reinvestment Act (ARRA) and other sources; once that funding came through, these projects enrolled in the Pilot. By the end of the first year, ICF was using its more comprehensive database described in Section 3, which also tracks other projects that the design firms and architects working with ICF may have in the pipeline. ICF did outreach about the Pilot to these design firms as well as talking with them about trends in design and specifying equipment in order to get a handle on the energy savings potential for this sector as well as some of the issues that arise in trying to capture potential savings from emerging technologies. ICF also recruited for the Pilot through meetings and trade shows such as Build Boston. The ICF account manager noted that construction tends to be dispersed, so it is important to keep up the relationships and make sure developers and energy efficiency consultants are aware of the programs available.⁴

The ICF account manager further noted that the relationship-based process is very effective and should be the preferred method of outreach that should be used moving forward. Multifamily projects are controlled construction projects and as such are the domain of the “licensed” design community. Architects and mechanical/electric/plumbing service providers (MEPs), along with green/energy efficiency consultants know what the multifamily project pipeline is in Massachusetts more so than individual developers, contractors and funding agencies. Members of the first group are involved in multiple projects, the latter group, only one and two at a time.

It is important to keep in mind that the Pilot had a very limited time period in which to enroll projects that would complete by the end of 2012. Given this constraint, it is not surprising that many of the projects enrolled were particularly receptive to energy efficiency or green building. If the sponsors go forward with a program that has a time frame longer than the Pilot’s three years, the relationship-based approach can be expanded and used to recruit participants with less of an energy efficiency or green building tilt.

As noted in Section 2, more than 70% of the total projects, units, and square footage in the Pilot involve affordable housing. The ICF project manager observed that ICF’s contacts with design companies working with low income and affordable housing are not likely to yield many market rate projects, even as economic conditions improve, since the latter often have different developers. Furthermore, the Pilot has a limited budget and the low income and affordable housing developers are the most aggressive in going after these monies.

⁴ICF is not currently doing active recruiting since the Pilot is set to expire at the end of 2012; any potential participants at this point would have construction well underway. ICF is, however, doing outreach for potential programs under development and to expedite and facilitate multifamily project applications for commercial incentives.

Six of the nine participants interviewed said they learned of the Pilot through ICF; one of these met the ICF project manager at a Build Boston event. Two participants said they were referred to the Pilot through National Grid and one participant got a referral from Conservation Services Group which had done earlier inspection work for him. Three participants noted that part of their jobs as green building or energy efficiency consultants is to identify and coordinate utility rebates for developers; as such, they stay in touch with both ICF and the utility representatives. One noted that her company had known the Pilot was under consideration even before it was officially launched.

About one-half of the fourteen projects that had completed participation, in terms of square footage, were in an early design stage with the HVAC equipment still under discussion when they learned of and signed up for the Pilot (Table 5-1). While the proportion of projects that signed up for the Pilot in their early design stages will probably increase as more projects complete in 2012, the issue remains that multifamily planning and construction, especially in the case of affordable housing, is a multiyear process. A program operating over the long term is more likely to sign up projects in the earliest stages.

Table 5-1: When Learned of Pilot

When Learned of Pilot	Number of Projects	Number of Units	Square Footage	Percent of Sq Ft	MMBtu Savings	Percent of Savings
Early design stage—in process of specifying HVAC equipment	7	351	394,809	49%	4,941	56%
Plans complete—HVAC equipment specified but not ordered; construction not started	4	143	177,491	22%	1,518	17%
Construction started—HVAC equipment specified but not ordered	2	187	197,936	24%	2,065	23%
Construction started—HVAC equipment ordered	1	40	37,726	5%	299	4%

6 Coverage of Measures

The Pilot was designed as a prescriptive program addressing 154 energy conservation measures over seven categories. The aim was to include the most common measures installed at the outset and approve other measures on a case-by-case basis if they made sense. A common theme of the interviews was the need for a performance-based system; interviewees also mentioned specific measures they would like to see covered. The interviewees thought the Pilot addressed energy savings in the tenant or condominium units of the buildings served fairly well. Most participants considered labeling, such as provided by ENERGY STAR, to be fairly important but were reluctant to pay for performance testing themselves.

6.1 Performance-Based Systems

One advantage of a performance-based system, according to ICF, the Pilot's implementer, is that it would allow more focus on emerging technologies such as air source and ground source heat pumps, chillers, and super-high-efficient envelopes; these are high efficiency technologies that are difficult to promote in a prescriptive program which does not deal with the interaction among measures. The way to deal with evolving codes and technologies is through modeling and the ICF project manager thought that the sponsors should work on a protocol for accepting energy modeling data for multifamily buildings. Until now, where there has been modeling, the sponsors have needed engineers to review the inputs and the model, which makes modeling expensive for both the sponsors and the participants for relatively small multifamily buildings. Compounding this problem, until quite recently, has been the lack of a nationally accepted multifamily modeling protocol. With the release of the EPA ENERGY STAR Multi-Family Hi-Rise (MFHR) standard, an acceptable baseline for modeling now exists. In addition, many buildings already have third party verification—they may have applied for, or are required to pursue LEED certification, for example—and the sponsors can try to achieve economies of scale by taking advantage of any such modeling and verification that has already been done.

Two of the participants interviewed also called for a more performance-based program.⁵ One was of the opinion that the Pilot is focused on prescriptive measures with very short payback periods and under-incentivizes energy efficient equipment choices. She would have the Pilot fund some energy modeling for projects it reaches in the design stage; developers need some incentive to offset the costs of modeling which enables them to reach a higher level of energy efficiency. The other participant also called for a more comprehensive energy use analysis; he thought the Pilot needs to establish a multifamily baseline so that building performance can be compared to it. He also thought that a performance based system should offer trade-offs on which measures are installed.

⁵ Participants were asked in general terms how they would improve the Pilot; they were not explicitly asked if they would have wanted a performance-based program.

6.2 Feedback on Measures Not Covered by the Pilot

As noted in Section 2, the Pilot was designed as a prescriptive program addressing 154 energy conservation measures for multifamily buildings and looking to further identify opportunities for energy efficiency in these buildings. The measures discussed in this section represent a wish list for which some participants believe they should have received incentives.

Most comments about the measures the interviewees felt should be covered but are not concerned the Pilot's coverage of HVAC systems. The Pilot's implementer and one of the participants interviewed talked at length about the participant's experience trying to get an incentive for an air source heat pump, the City Multi, manufactured by Mitsubishi. This equipment, according to the interviewees, is far more efficient than the measures covered by the Pilot, but, since it does not have a fixed SEER rating, was not eligible for an incentive. ICF spent considerable time early in the Pilot contacting the manufacturer to obtain the data necessary to qualify this equipment. In the end, the inverter based compressor mechanism of this emerging technology fell below the standards used by the Pilot.

Two participants (one of whom was responsible for two projects) tried to make the case for better coverage of ground source heat pumps (GSHPs). The Pilot provides incentives for energy-efficient GSHPs, but the interviewees thought that it does not take into account that all GSHPs improve the building's carbon footprint and make it greener. The Pilot does not provide support for the work that goes into digging wells for GSHPs, just for the units themselves, if they have a minimum rating.

One participant initially thought the Pilot covered efficient central chillers, but found out it did not and then needed to apply through Cool Smart and process a prescriptive application to get an incentive. Other suggestions from the participants included considering indoor air quality and incentivizing air exchangers as well as covering solar panels.

6.3 Rental Units and Condominiums

The participants and the implementers interviewed believe the Pilot addresses tenant spaces and condominiums fairly well through the HPBA which offers air sealing compartmentalization with blower door tests done on individual units. In addition, the Pilot offers incentives for CFLs and ENERGY STAR appliances installed in the units.

One participant noted that if higher incentives were offered for efficient central air conditioning, her project could have installed an efficient system and that would have saved the tenants from using room air conditioners, which are not addressed by the Pilot. The Pilot implementer noted that tenant spaces and condominiums could be further addressed with incentives going to the tenants or condo owners to work on plug loads where there are considerable energy savings to be realized.

6.4 Importance of Labeling

The participants interviewed were reminded that the Pilot, while providing incentives for energy efficiency measures does not provide a label indicating a building is energy efficient as ENERGY STAR does for low rise multifamily construction and qualifying four-and five-story multifamily buildings where each unit has its own heating, cooling and water heating system. The three participants with market rate housing considered labeling to be somewhat to very important as a marketing tool. Three of the participants with affordable housing also considered labeling to be fairly important; the most common reason was as a requirement for funding. One participant wished that ENERGY STAR Version 3, which she saw as supporting comprehensive energy efficient design with a focus on healthy buildings, was still supported in Massachusetts. In the absence of program support, her company has to hire a third party verifier to demonstrate equivalence which involves more time and expense than the program did. Another affordable housing participant thought labeling was important even though the Pilot provided some of the benefits of labeling

“It drives the design and construction of the building and holds the construction team accountable. Fortunately, the Pilot fulfilled that role even though it did not provide labeling. Labeling is also important because it provides recognition, at the end of the process and helps [us] raise funding for the next project. Projects that are labeled can be used as examples or demonstrations of what is possible with energy efficient construction, especially in communities or with developers that do not have a lot of green building experience. Labeling is also important, even in affordable housing, as it allows the owner to relay this information to the residents and give them pride in their living spaces.”

The participants who considered labeling at all important were generally reluctant to pay for the performance testing required. Those with affordable housing noted that they have tight financing and would be hard pressed to pay for a label if it were not being subsidized. Others said they would pay for LEED certification because that is the way the system has been set up. Developers are used to not paying for ENERGY STAR certification. With the system changed, two affordable housing participants thought developers would probably pay for ENERGY STAR labeling if the rebates were large enough.

7 Measures Installed

The Pilot offers incentives for 154 energy conservation measures; most completed projects have received incentives for ten to fifteen measures. The participants with projects that signed up for the HPBA gave generally positive feedback on the process. All of the participants interviewed said they had planned to install essentially all of the measures for which their projects had received incentives before learning of the Pilot. But the participants with affordable rate projects had also assumed that there would be some funding to help defray the costs of building energy efficiently.

7.1 Types of Measures Installed

Table 7-1 shows the types of measures installed by the fourteen projects that had completed participation in the Pilot by the end of January 2012. Looking at the square footage affected by the Pilot, all or almost all projects installed high efficiency fluorescent fixtures, CFL fixtures in the units, occupancy sensors, ENERGY STAR refrigerators and dishwashers, and low flow showerheads. The vast majority also installed high efficiency hot water boilers (90% EF), efficient windows ($U=0.35$ or 0.50), and wall insulation (R-19 + R-5 with steel framing). Most of the square footage served achieved air infiltration at 7 ACH50 and installed energy efficient central gas boilers (90 AFUE) or furnaces (94 AFUE); the majority also installed variable frequency drives. Most of the projects have master metered units as detailed in Section 8.

Measures less likely to be installed included boiler reset controls, premium motors and pumps, air or ground source heat pumps, and indirect fired water heaters. Very few projects received incentives for ceiling insulation, central air conditioners, dual enthalpy economizers, furnace motors, and daylight dimming systems.

Table 7-1: Measures Installed Through the Multi-Family New Construction Pilot

	Number of Projects	Number of Units	Square Footage	Percent of Completed Sq. Ft.
Total Projects Completed	14	721	807,962	
Envelope Measures				
Wall Insulation	12	590	649,219	80%
Ceiling Insulation	2	63	66,726	8%
Efficient Windows	13	624	682,584	84%
Air Infiltration at 7 ACH50	4	113	136,067	17%
Air Infiltration at 7 ACH50 w/HRV	6	440	503,249	62%
High Performance Building Adder	12	650	727,557	90%
HVAC Measures				
High Efficiency Boilers or Furnaces	10	460	522,091	65%
Boiler Reset Controls	6	263	282,947	35%
Central ENERGY STAR AC	2	66	78,181	10%
Furnace Motor	2	54	61,726	8%
Air Source Heat Pumps	2	84	101,674	13%
Ground Source Heat Pumps	2	198	219,096	27%
Dual Enthalpy Economizers	2	52	60,141	7%
Lighting Measures				
50% CFL Fixtures	1	40	37,726	5%
100% CFL Fixtures	11	547	597,818	74%
100% LED Fixtures	1	97	125,378	16%
High Efficiency Fluorescent Fixtures	14	NA	NA	NA%
Occupancy Sensors /Controls	11	NA	NA	NA%
Daylight Dimming System	1	NA	NA	NA%
Hot Water Measures				
High Efficiency Hot Water Boiler	11	621	696,416	86%
Indirect Fired Water Heater	5	149	160,281	20%
Low Flow Showerheads	12	644	723,196	90%
ENERGY STAR Dishwashers	13	690	775,236	96%
Appliances				
ENERGY STAR Refrigerators	13	712	799,661	99%
Motors				
Premium Motors and Pumps	3	88	95,091	12%
Variable Frequency Drives	8	529	596,280	74%

The participant interviewees generally said they installed the measures listed in Table 7-1 because they wanted to use energy efficiently, incorporate best practices, and build green as much as possible. Four of the six interviewees with affordable housing projects also cited wanting to keep operating costs low.

Two participants also noted that many of the measures installed such as wall insulation and efficient windows are required to meet stretch code requirements in Boston. Four of the six interviewees with affordable housing said they needed to meet ENERGY STAR equivalent levels to obtain HUD funding.

Participants were asked if they thought more measures would be installed under a program that structures incentives to provide graduated bonuses for projects that did 80%, 90% or 100% of the cost-effective measures identified. Four interviewees thought that graduated incentives might capture more savings but they also thought graduated incentives would have to be tied to performance, not prescriptive measures. Performance incentives would then reflect the fact that it is harder and more expensive to improve performance the more efficient a building becomes. Two interviewees simply thought that incentives have to cover incremental costs and the remaining three did not think graduated incentives would have applied to their projects.

7.2 Use of the HPBA

Twelve of the fourteen projects completed signed up for the HPBA. The HPBA contractor, also referred to as the Third Party Verifier, is hired and paid by the participant, with a set amount reimbursed by the program. ICF provides a list of nine firms that are qualified to act as HPBA contractors, though participants may hire a different firm if it submits appropriate HERS or Building Performance Institute qualifications.

The seven participant interviewees representing the twelve projects that signed up for the HPBA gave generally positive feedback on the process. Comments included:

“It identified the areas that needed to be sealed better...their building contractor had [agreed to] comply with ENERGY STAR [standards], but it was helpful to have an outside party come in to do the testing and tell them what needed to be sealed.”

“Third party verification is an extra important part of the building process. It holds contractors to the standards set if they know someone is coming in to test the building’s performance in meeting the air sealing/air leakage goals set in the construction specifications.”

“The HPBA helped the owner see significant savings in heating costs”

“Provided some of the information needed for LEED certification; the testing needed for LEED was more rigorous than what the HPBA would do, but it helped take care of some LEED requirements and it made coordination easier.”

One participant noted that the builders pushed one of the units to completion so that the third party verifiers could do blower door testing. This enabled them to identify and correct sources of air leakage before the drywall was up for the whole building.

Ten of the twelve projects that signed up for the HPBA met the goal of reducing air infiltration to 7 ACH 50. One project did not meet the air leakage standards due to leakage through elevator

shafts; information was not available for the other project.

Two of the fourteen completed projects did not sign up for the HPBA. One was too far along in the construction process and the envelope was sealed by the time the participant learned of the HPBA. In the other case, the project was a gut rehab which constrained what could be done for air sealing and the participant did not think the HPBA made sense.

7.3 Plans to Install Measures

All nine of the participants interviewed said they had planned to install essentially all of the measures for which their projects had received incentives, before learning of the Pilot. The only exceptions were one participant with affordable housing who would not have installed screw-in compact fluorescents in the tenant units of one building (they were only going to install fluorescents where there were pin-based sockets) and another participant who would not have installed LEDs in common area lighting in one building.

Asked whether they would have installed all the measures credited to the Pilot without the incentives, the six participants with affordable rate projects thought that the question was not relevant. While they did not know of this particular Pilot when they were planning their projects, all six had assumed that there would be some funding to help defray the costs of building energy efficiently. One said,

“It is hard to say what [the owners] would have done without incentives since they did the design assuming there would be a program that they would qualify for. Since they work in Massachusetts, that is a given and they don’t consider what they would do if there are no incentives. [We] thought it would come in under a commercial program since the building was too tall for ENERGY STAR and had already talked with NSTAR about their commercial program.”

Another participant commented on the building process for affordable housing and the role of prescriptive incentives,

“In general, [my] job is to stay on top of the utility incentives being offered for [my] clients. The decisions on the measures to install go from difficult to easy where there are utility incentives available. There are a lot of factors that go into the decision of which measures to install—at the end of the day, the owners will choose to install more energy efficient measures if there are more incentives available to offset the costs.”

“[I] cannot really comment on individual measures. Even though the Pilot offers incentives for prescriptive measures, the decisions are made as part of an integral design, so it is not possible to trace whether a particular measure would be installed in the absence of an incentive.”

The market rate participants appeared to be less interested in the incentives offered. One participant with two market rate projects said they would have installed everything in the

absence of any incentives because they have always “built green.” The other noted that his building was pretty far along (the foundation had been laid) when he learned of the Pilot and all decisions had been made. The third market rate participant offered an interesting observation—he had assumed, based on his experience with ENERGY STAR, that the incentives available for his building would be much higher during the design process. If he had known he would only get one-tenth of the HVAC incentives that he thinks he would have gotten under ENERGY STAR, maybe the owners would not have allowed him to install a 94 AFUE gas furnace and the 15 SEER central air conditioner.⁶

It should be noted that Pilot participants were drawn from a list of active green designers, so the high free-ridership is not unexpected. Future efforts will need to attract projects from designers not currently involved in energy-efficient design and construction.

The participants interviewed did not believe they had received any technical assistance for considering additional energy efficiency measures, with the exception of the HPBA providing guidance on better air sealing. (One interviewee noted that, as a green building consultant, that was her job.) There had been few discussions with ICF of measures that the participants ultimately chose not to install. One participant said he learned too late in the process of the incentive offered for installing 100% CFLs. Another interviewee remembered some discussion of pipes to recirculate heat from waste water and more complex variable frequency drives (VFDs) and controls, which were too expensive for her affordable housing project and, in any case, she had enrolled in the Pilot after the design for her building was complete.

As noted in Section 5, due to the long-term nature of multifamily new construction, about one-half of the completed projects, in terms of square footage, were in an early design stage with the HVAC equipment still under discussion when they learned of and signed up for the Pilot. Indeed, the Pilot’s implementer noted that they have run on a three year regulatory cycle while multifamily buildings run on a five to six year cycle from start to occupancy. Ideally, a program should be present at the beginning when the windows and walls are planned; measures such as VFDs, premium pumps, low-flow showerheads, and lighting controls, however, can be added rather late in the design process. While this timing may not affect the measures ultimately installed if participants simply assume there will always be some sort of incentive available, under a more long-term program, it may be possible to more clearly delineate the effects of incentives and technical assistance on measure installation. Indeed, the Pilot had initially planned to offer technical assistance to participants, as needed, to consider the addition of energy efficiency measures to mid-rise multifamily buildings. However, as noted in Section 5, the timing of the Pilot meant that a large share of the projects enrolled were fairly well into the design phase and with a green building tilt. The Pilot could only provide minimal technical assistance to these projects. It should thus be noted that if a program aims to provide technical assistance in considering all applicable energy efficiency measures, it needs to get to a project before the design phase.

⁶ This case is discussed in detail in Section 9.

8 Barriers to Energy Efficient Multi-Family Construction

The split incentive, that is, the fact that the developer pays for energy efficiency improvements but the unit owners or tenants who pay for their own heat and utilities benefit from lower energy bills, is commonly considered a barrier to building energy efficient multifamily homes. Most of the participants did not consider the split incentive to be an important barrier for their projects. Cost was considered the most important barrier to energy efficient construction; also frequently mentioned was a lack of technical knowledge in a changing field.

8.1 Split Incentive Barrier

The Pilot's implementer believed the split incentive is more of a barrier for market rate projects and the Pilot, as already noted, has had mostly affordable projects; cost is the main barrier to energy efficiency for the latter. Still, it is important to deal with developers who just want to move on to their next project and feel the owners will deal with the bills. The unit owners have to know and care about energy consumption; the units have to be marketed based on the energy that they consume rather than the measures installed.

Five of the six participants with affordable housing projects interviewed did not consider the split incentive a barrier for them; one interviewee thought the split incentive barrier affected even affordable housing, though she thought affordable housing developers try harder than market rate developers to overcome this barrier. The main reason the split incentive was not much of a barrier for these participants was that, in most of the affordable housing projects completed under the Pilot, the building owners were paying for heating; in three projects, the owners were also paying for electricity. Table 8-1 summarizes who pays for heating and electricity.

Table 8-1: Payment for Heating and Electricity

	Number of Projects	Number of Units	Square Footage	Percent of Sq Ft
Building owner pays for heating; tenants pay for electricity—affordable housing	6	303	357,810	44%
Building owner pays for heating and electricity—affordable housing	3	230	230,411	29%
Tenants pay for heating and electricity—affordable housing	1	48	68,200	8%
Tenants/unit owners pay for heating and electricity—market rate	4	140	151,541	19%

The three interviewees with market rate projects had varied perceptions of the split incentive barrier. One thought it was a barrier but mostly affected more expensive projects such as near zero energy buildings. The second thought it need not be a barrier if the unit's price could reflect

its building costs, which he admitted is hard to do in the current market. The third interviewee did not think the split incentive affects his firm, but it does affect most of the developers in the market.

Addressing the split incentive barrier, according to the four interviewees who see it as having an effect on multifamily construction, involves both offering rebates that cover the incremental cost of energy efficiency measures and convincing owners or tenants to pay more for energy efficient housing. One interviewee notes,

“In addition to higher incentives, the way to address this barrier is through education so that consumers demand energy efficiency and labeling. Until the consumers demand it, the utilities and the state need to offer higher incentives to developers to promote energy efficiency.”

However, another interviewee has less faith in incentives and notes that consumer demand will ultimately drive the energy efficiency of multifamily homes.

“When a developer wants to maximize profits by keeping costs down, the incentives are a minor part of the whole cost and will not have much influence. What will work is building market demand; require labeling of buildings [the stretch code communities do something similar in giving houses a HERS rating] so that owners know how much energy the home will use and how much it will cost to operate; also advertise to prospective buyers how much CO2 is being saved.”

Six of the participants interviewed representing eleven projects said that energy efficiency is emphasized in renting or selling the units; this is the case for the affordable housing rentals where there are far more applications than available units. An interviewee with affordable housing noted that both the residents and the building management company received walk-throughs and written materials on energy efficiency and operations. However, an interviewee with market rate housing thought that while energy savings could be substantial enough to be a marketing point for a zero energy home, savings to the unit owners from the measures installed through the Pilot cannot be quantified and thus not used in marketing.

8.2 Other Barriers to Energy Efficiency in Multifamily Buildings

Cost. Cost was mentioned as a barrier to energy efficient construction by eight of the nine participants interviewed as well as the sponsor and implementer interviewees. Participants with affordable housing addressed cost issues from the following perspectives.

“With affordable housing, there is no budget flexibility so the right choices can only be made if they fit the budget.”

“For affordable housing; the building budget always runs over what has been raised, so no one wants to add to costs for something not necessary...there is a long lead time—often three years between starting to raise money and starting construction. In the

meantime, the cost of raw building materials, such as steel, can go up sharply while grants from HUD and other sources do not keep up with rising costs. There is then the pressure to install a less expensive heating system or windows, so energy efficiency can suffer to keep costs under control.”

“Most developers look for five-year paybacks...incentives need to rise to help builders reach a five year payback.”

All of the participants with market-rate projects also mentioned cost as a barrier and were concerned that buyers would not pay a premium for energy-efficient units that would allow developers to recoup incremental costs. One noted that, while his project consisted of market rate units, they were not intended for high income buyers, so keeping control of building costs, and selling prices, was definitely a concern. He added that they were using smaller, less experienced, builders to keep building costs down and that energy efficiency measures added uncertainty to the quotes and estimates that these builders provided. He also thought a lot of builders will assume they can charge a premium if a project is termed energy efficient.

Technical Knowledge. The lack of technical knowledge in a changing field was mentioned as a barrier by four of the nine participants interviewed. Two affordable housing participants spoke of the long lead times for their projects exacerbating issues with technical knowledge. One noted,

“There is a long lead time between design and building; this leads to technology lag as new technologies are being introduced rapidly. New technologies also mean that developers face operating risks. If a heating system part fails in the middle of the winter, they don’t know how easy it will be to get a new one—but if they install a standard boiler, 80% efficiency, they know they will have no trouble finding replacement parts if they need them. New technologies also call for a more sophisticated staff and training for building operation.”

Related to the technical knowledge barrier is the issue of coordination; one interviewee spoke of the need to make sure the right information is available during the design phase of the building. Another participant noted

“There needs to be enough time to do coordination between green building design teams and architects; it’s important, for example, to make sure the right HVAC system is installed to keep with the energy efficient architecture.”

The Pilot’s implementer also thought the lack of technical knowledge was a major barrier noting that there was too much information and decision fatigue; it is hard to stay up to date when a developer has one or two projects and building science best practices change from year to year. One of the sponsors noted that for a while there were few multifamily buildings under construction, so there was not much data coming out. She also thought that there is a need for more data on what energy efficiency measures actually save in multifamily buildings.

Transitional Housing. An interviewee with market rate units thought an important barrier to energy efficient multi-family construction is that it is seen as transitional housing. Even when people pay a lot of money to buy a condo, they do not think that they will live there for a long time because they will either start a family and move to a single family home or are empty nesters and think they will move on and are used to paying larger utility bills anyway. Therefore, it is hard to sell them on paying more for measures that will pay for themselves with lower bills over time.

9 Satisfaction

All of the participants interviewed give high marks to the account manager and other staff they worked with in the Pilot for all the projects completed. Overall satisfaction with the experience of participating in the Pilot also was fairly high. Participants were less satisfied with the incentives received though most still said they were satisfied (four on a one to five scale). Table 9-1 presents the ratings given by the participant interviewees for each project completed.

Table 9-1: Participant Satisfaction
(all projects completed; n=14)

	Account Manager and Other Staff	Overall Process	Incentives Received
Very Satisfied	14	9	1
Satisfied	0	4	8
Neither Satisfied not Dissatisfied	0	1	2
Dissatisfied	0	0	2
Very Dissatisfied	0	0	1

All of cases of dissatisfaction involved participants comparing incentives with the amounts they thought they would have received under ENERGY STAR. The participant with one project who was very dissatisfied with the incentives thought that calculating HVAC incentives based on tonnage rather than the units served was appropriate for large buildings but not for the mid-rise multifamily market. He installed a 94 AFUE central gas furnace and a 15 SEER ENERGY STAR central AC unit. He thought that his incentive would have been ten times as large if the building had qualified for ENERGY STAR.⁷ The ICF project manager thought that this project may have received the much higher incentives several years ago, but the interviewee's calculations were not realistic at present with multifamily incentives more closely tied to expected savings. Still, it is not surprising that participants who had explored ENERGY STAR incentives for smaller buildings several years ago were dissatisfied when they realized mid-rise multifamily buildings were eligible for lower incentives.

The two participants with one completed project each who were dissatisfied with the incentives received also compared these incentives to what they thought they would have received with ENERGY STAR certification. One thought ENERGY STAR would have provided almost double the incentive on a per unit basis and she had counted on receiving that amount. She thought her building would have qualified for ENERGY STAR if it had individually metered units; however, that is not common for affordable housing; thus, she thought ENERGY STAR

⁷ His calculation is that he would have gotten \$1000 per unit for this system or \$37,000 for a 37 unit building; instead, he got \$3400 for the gas furnace and \$643 for the AC which comes to less than \$100 per unit

discriminates against affordable housing. The other dissatisfied interviewee said that, on a per unit basis, the Pilot's incentives were about one-half to one-third compared to the incentives single family homes get under ENERGY STAR.

Participants who did not say they were dissatisfied with the incentives received also made ENERGY STAR comparisons with one noting that the incentives were only about one-half of what he had previously received through the Massachusetts New Homes with ENERGY STAR Program. (He also believed his project should have qualified for ENERGY STAR, except for what he considered a minor technicality.) Another participant said the incentives did not fully cover incremental costs for energy efficient measures above code.

While acknowledging that the incentives could always be higher, most participants were happy to have a mechanism to specifically address this type of building. One interviewee expressed satisfaction that the Pilot encompassed the whole building, including the common areas and central HVAC system, not just the residential units. Participants also were happy to not have to go through the commercial programs and not have to apply separately for electric and gas incentives.

10 Conclusions and Recommendations

The Pilot has finished its second year with its process operating fairly smoothly to address the needs of the mid-rise multifamily new construction market with participants reporting high overall satisfaction. Participants with experience in this field are aware that if the Pilot was not available, they would have had to go through the very technical process in a commercial prescriptive program without the user-friendly support provided by the Pilot. Participants also appreciated being able to apply for electric and gas incentives in one place.

From the implementer's perspective, the initial participation process in a similar program could be improved by providing an interactive project tool that would allow the customer user to enter the measure inputs and see the savings and incentives right away; having the customers interact with such a tool on their own time would help educate them on what works to capture energy savings potential. This tool would be especially useful in a program where there are more projects in earlier planning stages.

The Pilot's implementers and participants both pointed out the advantages of a performance-based system. The interviewees thought such a system would allow more focus on emerging technologies such as air source and ground source heat pumps, chillers, HVAC controls, and super-high-efficient envelopes.

Timing remains an issue. About one-half of the fourteen projects that had completed participation, in terms of square footage, were in an early design stage with the HVAC equipment still under discussion when they learned of and signed up for the Pilot. The timing of these projects is due to the long development cycle for multifamily new construction, especially for affordable housing. The Pilot ran on a three year cycle while multifamily building runs on a five to six year cycle from start to occupancy. Ideally, program engagement should occur during the conceptual design phase of a new project if it aims to provide technical assistance in considering all applicable energy efficiency measures. It should also be noted that participants who reported difficulties with the Pilot's process were likely to have enrolled relatively late in their project's cycle.

The project manager thus emphasized the need for the sponsors and regulators to take a longer term view. Year to year efforts with no longer term commitment struggle to address the multifamily market which takes a far longer view. Doing outreach with design teams uncovers projects that may be in the pipeline and coming out in a few years dependent on funding. It is frustrating to tell people that programs are renewed each year and there is no guarantee that they will be around in two or three years; that is not how this market operates.

The following recommendations are offered based on the findings from the interviews conducted with the Pilot's sponsors, implementers, and participants.

- **Offer a performance-based program for the mid-rise multifamily new construction market, or possibly the entire multifamily market over three stories.** The integral

nature of the design for buildings of this size should be taken into account as well as the fact that it gets much harder and more expensive to improve performance as a building becomes more efficient. A performance-based program would also address gaps such as a participant having to go through a different program to cover efficient central chillers.

- **The Pilot’s verification of ventilation and infiltration rates for individual units through the HPBA is a positive innovation.** More testing is needed to understand how much energy can be saved by including these measures in multi-family new construction practices. However, given that quality installation of insulation and air sealing have shown to be important in single family structures, the chances are good that similar activities will prove cost-effective for multi-family buildings. The multi-family program should continue to fund and encourage these measures.
- **Offer a long-term program.** Ideally, a program would run for five years and be renewed annually, so that prospective participants know that the program will be in place when their projects complete. With a longer-term program, implementers should focus their efforts on reaching projects at the earliest stage possible.
- **Try to identify and recruit more projects with less of an energy efficiency or green building tilt.** Having a longer-term program in place should allow the implementers to expand their relationship-based marketing focused on the design community enabling them to reach more projects and provide the assistance they need to incorporate higher levels of energy efficiency. It is also important to devote more resources to outreach so that implementers can identify and pursue upcoming projects from different sources, such as the Dodge Reports.
- **Consider offering assistance and support for the design team, especially as more projects with less of a green tilt are recruited.**
- **Consider efforts to address market concerns and misperceptions about energy-efficient building practices.** Participant interviews identified a number of concerns particular to this market, notably that more efficient systems need more sophisticated staffs and training for building operation and that it would be more difficult to obtain replacement parts. The Pilot is developing a database documenting a number of characteristics of multifamily buildings, such as size and applicable technologies; these data may be used to provide assistance to design teams as well as help design future programs.
- **The goals and objectives for future pilots and programs need to be clearly defined at the outset.** Explicit goals would enable evaluators to better assess how well the effort has met its objectives.

Appendix A: Sponsor Interview Guide

MA RNC 4-8 Story Multi-family Pilot Final: SPONSORS

Overview

1. What do you see as the overall goals of the Multifamily New Construction Pilot Program?
2. What are the Program's goals for your company?

Program Processes

3. What type of outreach has been done for this Program? Do you think it has been successful in meeting goals? How about in reaching low-income, affordable, and market rate projects?
4. Have you received any feedback from developers participating in the Multifamily New Construction Pilot Program? If yes, what feedback have you received?
5. Have you received any feedback from developers who have inquired about but not participated in the Multifamily New Construction Pilot Program? If yes, what feedback have you received?
6. What is the participation process for developers interested in the Program? How well do you believe the Program is working to provide a seamless, user-friendly delivery?
7. What are the goals of the Multifamily Market Integrator (MMI) administered by RISE? How does the MMI apply to this Program and how well do you believe it is working for new construction? Do you believe there is more RISE should be doing for the Multifamily New Construction Pilot Program? If yes, what could they be doing?
8. What Program data is provided to you and how often is it provided? Is the data provided adequate for your needs? If not, what else would you like to see?
9. What is the process for disaggregating Program savings into the commercial and residential classes? Do you believe the process makes sense?

Program Design

10. Are there any efficiency measures you believe the Program should address, but does not? If yes, what are they?
11. As you know, the Multifamily New Construction Pilot Program provides financial incentives to developers for various energy efficiency measures. However, it does not provide a label indicating a building is energy efficient as ENERGY STAR does for low rise multifamily construction and qualifying four-and five-story multifamily buildings where each unit has its own heating, cooling and water heating system. How important do you think it is for new construction programs to provide labeling? Why?

12. Program materials noted that incentives would be paid by gas utilities for projects in areas serviced by municipal electric companies. What has been the role of the gas utilities in this Program? Have there been any projects in municipal electric areas and, if so, how have they been handled? Do you think projects outside the National Grid and NSTAR territories can be served? What would need to happen to cover them?

Split Incentive and Other Barriers

13. Do you believe the split incentive, that is, the fact that the developer pays for energy efficiency improvements but the unit owners or tenants who pay for their own heat and utilities benefit from lower energy bills, is a barrier to building energy efficient multifamily homes? If yes, how much of a barrier is it? If yes, how can this barrier be addressed?
14. What other barriers are there to building energy efficient multifamily homes? How do these vary for low-income, affordable, and market rate projects? How can they be addressed?
15. How well do you think the Program is addressing the barriers to energy efficient multifamily new construction in general? What about low-income, affordable, and market rate projects?
16. This program has a particular need to reach the tenant spaces of these buildings. What incentives should be offered? Should access to incentives for common areas require that some investment be made in tenant spaces?

Closing

17. What would you say are the Program's greatest strengths? And what would you say are its weaknesses? What could be done to address these weaknesses?
18. Based on your experience so far, what are the most important improvements that still need to be made to the Program? Where do you see this Program going when the Pilot expires in 2012?
19. Are there any questions you would particularly like us to ask the implementers, participants, nonparticipants, or agencies providing leads for the Program?
20. Are there any other program issues we have not discussed that you would like to mention?

Thank you very much for your time.

Appendix B: Implementer Interview Guide

MA RNC 4-8 Story Multi-family Pilot Final: IMPLEMENTERS

Overview

1. What do you see as the overall goals of the Multifamily New Construction Pilot Program?
2. What are your responsibilities for the Multifamily New Construction Pilot Program?

Outreach

3. What type of outreach has been done for this Program? Do you think it has been successful in meeting goals? How about in reaching low-income, affordable, and market rate projects?
4. What types of projects have signed up for the program? How many have a requirement that they comply with ENERGY STAR or its equivalent for funding purposes?
5. What types of projects have inquired about the Program but not yet signed up? Why do you think they have not signed up? Are there any types of four to eight story multifamily projects that are least likely to be reached by the Program? If yes, what are they?

Participation Process

6. What is the participation process for developers interested in the Program? How well do you believe the Program is working to provide a seamless, user-friendly delivery?
7. What information do developers need to provide to participate in the Multifamily New Construction Pilot Program, both at initial registration and at completion to receive their incentives? How is this information provided? How much time and effort do you think it involves? Who helps them?
8. What are the goals of the Multifamily Market Integrator (MMI) administered by RISE? How does the MMI apply to this Program and how well do you believe it is working for new construction? Do you believe there is more RISE should be doing for the Multifamily New Construction Pilot Program? If yes, what could they be doing?
9. What Program data do you provide to the sponsors and how often is it provided? Do you think this data is adequate for their needs? If not, what else could be provided?
10. What is the process for disaggregating Program savings into the commercial and residential classes? Do you believe the process makes sense?
11. Program materials noted that incentives would be paid by gas utilities for projects in areas serviced by municipal electric companies. What has been the role of the gas utilities in this Program? Have there been any projects in municipal electric areas and,

- if so, how have they been handled? Do you think projects outside the National Grid and NSTAR territories can be served? What would need to happen to cover them?
12. Why do you think all the participants have signed up for the High Performance Building Adder?
 13. What is the process for participating in the High Performance Building Adder? How far along are the participants with this process? What issues have arisen as more projects move along this process?
 14. As you know, the Multifamily New Construction Pilot Program provides financial incentives to developers for various energy efficiency measures. However, it does not provide a label indicating a building is energy efficient as ENERGY STAR does for low rise multifamily construction and qualifying four-and five-story multifamily buildings where each unit has its own heating, cooling and water heating system. How important, if at all, is labeling to the developers you work with? Why?
 15. [If labeling is at all important] Do you think they would be willing to pay part of the costs of performance testing for their building(s)?

Measures Installed

16. Approximately how many of the measures discussed with the participants do they choose to ultimately install? Which of the measures discussed are most frequently installed? Which are least likely to be installed? How, if at all, does this vary for low-income, affordable, and market rate projects?
17. If incentives were structured to provide graduated bonuses for projects that did 80%, 90% or 100% of the cost-effective measures identified, what effect would this have what measures get included?
18. How many of the measures installed do you believe participants were planning to install before they learned of the Multifamily New Construction Pilot Program? Which measures? How likely do you think they would have been to install them without the Program? How, if at all, does this vary for low-income, affordable, and market rate projects?
19. Are there any efficiency measures you believe the Program should address, but does not? If yes, what are they?

Split Incentive and Other Barriers

20. Do you believe the split incentive, that is, the fact that the developer pays for energy efficiency improvements but the unit owners or tenants who pay for their own heat and utilities benefit from lower energy bills, is a barrier to building energy efficient multifamily homes? If yes, how much of a barrier is it? If yes, how can this barrier be addressed?

21. What other barriers are there to building energy efficient multifamily homes? How do these vary for low-income, affordable, and market rate projects? How can they be addressed?
22. How well do you think the Program is addressing the barriers to energy efficient multifamily new construction in general? What about low-income, affordable, and market rate projects?
23. This program has a particular need to reach the tenant spaces of these buildings. What incentives should be offered? Should access to incentives for common areas require that some investment be made in tenant spaces?

Closing

24. What would you say are the Program's greatest strengths? And what would you say are its weaknesses? What could be done to address these weaknesses?
25. Based on your experience so far, what are the most important improvements that still need to be made to the Program? Where do you see this Program going when the Pilot expires in 2012?
26. Are there any other program issues we have not discussed that you would like to mention?

Thank you very much for your time.

Appendix C: Participant Interview Guide

MA RNC 4-8 Story Multi-family Pilot Final: PARTICIPANTS

CONTACT NAME FOR ANY QUESTIONS ABOUT THE RESEARCH

Bill Blake	National Grid	781-907-1583
Beth Lonergan	National Grid	781-907-1540
Mary McCarthy	NSTAR	781-441-3888
David Ruggerio	ICF	781-413-4720

Background

21. How many years has your company been building homes or apartment buildings?
22. About how many buildings/residential projects have you worked on in the past ten years?
Of those projects approximately how many or what percentage::
 - Have (three or less, four to eight, over eight) stories
 - How many have less than ten, ten to 50, more than 50 units
 - How many are classified as low income or affordable (in terms of total units rather than projects)
 - Are in Massachusetts

Learning about the Pilot

23. How did you first learn of the Multifamily New Construction Pilot Program? [PROBE: how first heard of program, from who, multiple sources]
24. When did you first learn of the Program? What stage was the building at [ADDRESS(ES)] when you learned of the program? [PROBE: planning stage, plans complete, already ordered HVAC equipment, already started construction, what stage of construction]
25. What questions and/or concerns did you have about the Program? Were these questions answered to your satisfaction? If not, what questions were not answered to your satisfaction? Who provided you with the information you needed?
26. Have you participated in other programs or certifications promoting energy efficient new construction? If yes, which ones? [PROBE: ENERGY STAR, LEED, who sponsored, incentives involved]

27. Why did you decide to participate in the Multifamily New Construction Pilot Program? Was there a requirement that your project(s) comply with ENERGY STAR or its equivalent for zoning, funding, or permitting purposes?
28. What stage was (were) your project(s) in when you signed up for the Program? [PROBE: planning stage, plans complete, already ordered HVAC equipment, already started construction, what stage of construction]

Participation Process

29. What information did you need to provide initially to participate in the Multifamily New Construction Pilot Program? Did you find assembling the information and filling out the forms to be rather straightforward or considerably difficult? How long did it take to complete the necessary paperwork? Please explain.
30. What additional information have you needed to provide or will need to provide to complete the process and receive the incentives? [If the participant has already completed the process] Did you find assembling this information and filling out the forms to be rather straightforward or considerably difficult? How long did it take to complete the necessary paperwork? Please explain. [If the participant has not completed the process] Do you have any concerns about assembling this information. If yes, please explain.
31. What help, if any, did you receive in providing the required information? [For participants who have completed the process, ask about initial registration and completion.] Who helped you? Was this help adequate? If not, what additional help would you have liked?
32. In addition to help provided in completing paperwork, do you believe you received or will receive the technical assistance that you need(ed) for considering the addition of energy efficiency to your project? If yes, for what measures did you receive technical assistance? Did you or do you believe you will end up including these measures in your project?

Program Structure

33. As you know, the Multifamily New Construction Pilot Program provides financial incentives to developers for various energy efficiency measures. However, it does not provide a label indicating a building is energy efficient as ENERGY STAR does for low rise multifamily construction and qualifying four-and five-story multifamily buildings where each unit has its own heating, cooling and water heating system. How important, if at all, is labeling for your project(s)? Why?
34. [If labeling is at all important] Would you be willing to pay part of the costs of performance testing for your building(s)?

35. Our records show your project has signed up for the High Performance Building Adder. Can you tell me what you would like to gain from this part of the Program?
36. How far along the High Performance Building Adder process are you? [PROBE: haven't done anything, have called contractors, have met with contractors, have done testing, have received results]
37. [If have done anything on the High Performance Building Adder] How well has the High Performance Building Adder process worked for you so far? Why do you say that?

Measures Installed

38. Our records show [NUMBER] measures in the areas of [LIST] that you have installed or are planning to install at [ADDRESS(ES)]. Is this still accurate? If not, what has changed? Why did you make these changes?
39. Why did you choose to install the measures in the areas of [LIST]? What are the key advantages to installing energy efficiency measures that go beyond what you have to do to follow code?
40. Which, if any, of the measures in the areas of [LIST] were you planning to install before you learned of the Multifamily New Construction Pilot Program? How likely do you believe it is you would install any of the measures in [LIST] without the Program? If not unlikely, which measures do you think would be installed without the Program? What is the reason you would install these measures even if there were no incentives?
41. Were any additional measures discussed with your account manager that you chose not to install? If yes, what were they? Why are they no longer being considered? What would it take for you to install additional energy efficiency measures? Will you consider installing these measures in future projects? If not, why not?
42. If incentives were structured to provide graduated bonuses for projects that did 80%, 90% or 100% of the cost-effective measures identified, what effect would this have what measures get installed?
43. Are there any efficiency measures you believe the Program should address, but does not? If yes, what are they?

Split Incentive and Other Barriers

44. Are the units at [ADDRESS(ES)] to be condominiums or will they be rented? If units are to be rented, will your company still own the building(s)? If rented, who will pay for gas or any other heating fuel used? For electricity?
45. Do you believe the split incentive, that is, the fact that the developer pays for energy efficiency improvements but the unit owners or tenants who pay for their own heat and utilities benefit from lower energy bills, is a barrier to building energy efficient

multifamily homes? If yes, how much of a barrier is it? If yes, how can this barrier be addressed?

46. Are you or will you be emphasizing energy efficiency in marketing these units? If yes or maybe, how do you anticipate using it? If yes or maybe, have you found that advertising or emphasizing energy efficiency pays off? If project includes rental units, do you believe units would take less time to rent or command higher rents?
47. What other barriers are there to building energy efficient multifamily homes? How do these vary for low-income, affordable, and market rate projects? How can they be addressed?
48. What, if any, barriers did you encounter in participating in the Multifamily New Construction Pilot Program? How were these addressed? Were there any barriers not addressed to your satisfaction? If yes, which ones and why?
49. This program has a particular need to reach the tenant spaces of these buildings. Are the efficiency options in rental spaces that you did not do? If higher incentives would you have pursued them? If access to incentives for common areas required that more investment be made in tenant spaces, what would you have done?
- 50.

Satisfaction

51. Overall, how satisfied would you say you are with your experience participating in the Multifamily New Construction Pilot Program? Would you say you are:
 - a. Very satisfied?
 - b. Satisfied?
 - c. Neither satisfied nor dissatisfied?
 - d. Somewhat dissatisfied?
 - e. Very dissatisfied?
52. [If somewhat or very dissatisfied] Why were you dissatisfied?
53. How satisfied are you with the incentives you received or are scheduled to receive by participating in the Program?
 - f. Very satisfied?
 - g. Satisfied?
 - h. Neither satisfied nor dissatisfied?
 - i. Somewhat dissatisfied?
 - j. Very dissatisfied?

54. [If somewhat or very dissatisfied] Why were you dissatisfied?

55. How satisfied are you with the account manager and other staff you worked with?

k. Very satisfied?

l. Satisfied?

m. Neither satisfied nor dissatisfied?

n. Somewhat dissatisfied?

o. Very dissatisfied?

56. [If somewhat or very dissatisfied] Why were you dissatisfied?

Closing

57. As you may know, the Multifamily New Construction Pilot Program is currently scheduled to expire at the end of 2012. Are there projects in the pipeline that you believe would benefit from an extension of the Program or a similar offering? If yes, can you briefly describe these projects?

58. Do you have any other suggestions for improvements to the Multifamily New Construction Pilot Program that we have not already covered? If yes, please explain.

Thank you very much for your time.