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Massachusetts C&I Evaluation Contract Project Summary:

Gas Boiler Market Characterization Study Phase II

Project Timeframe: Jan. 2015 – Feb. 2017

Program Year(s) Evaluated: 2012 - 2014

Research Area: Market Assessment

High-level Study Objectives: Provide an understanding of the rate of change in the current baseline efficiency level and provide an analytic comparison to boiler programs in the surrounding Northeast Region

Recommendations & Key Supporting Findings

Raise the baseline assumption from 80% to 85% efficiency for boilers less than 2,000 MBH in size.

- This study estimates that condensing models represent about 74% of non-residential boilers sold in Massachusetts and that sales of condensing models are projected to continue growing in the future. In addition, preliminary estimates from the ongoing existing building market characterization study in Massachusetts indicate that high-efficiency (condensing) models represent 70% of newly installed <2,000 MBH gas hot water boilers since 2009.
- The number of rebates issued by the Massachusetts PA prescriptive gas boiler program has increased each year from 2012 to 2014.
- A scenario analysis indicates there may be several hundred or more condensing boilers sold each year in Massachusetts that do not receive program rebates. Lastly, the final rulemaking for commercial packaged boilers, which was issued on December 28, 2016, increases the minimum thermal efficiency from 80% to 84% for 300 to 2,500 MBH gas hot water boilers effective in 2020, which manufacturers anticipate meeting without difficulty as some have already begun re-tooling their factories.
- Under the new C&I baseline framework, if industry standard practice exceeds code then a blended market average serves as the baseline. Therefore, these findings indicate that the program should raise its baseline for <2,000 MBH gas boilers from 80% to 85% efficiency in order to accurately reflect the current conditions and trajectory of the Massachusetts market.

Offer a tiered rebate structure for all program-eligible models.

- The prescripitve rebate program already offers higher incentives for ≤300 MBH models that achieve 95% AFUE. Therefore, we recommend adopting a similar tiered rebate structure for >300 MBH boilers. There appears to be sufficient availability of 95%+ efficiency boilers, as 14% of all >300 MBH models available in the market meet this efficiency level.

Continue with the planned contractor education effort.

- The PAs are developing a quality installation program to ensure that contractors and distributors design and pipe condensing boilers correctly. In addition, manufacturers believe that training contractors on boiler system design and installation is essential in order to ensure that condensing boilers actually condense and therefore achieve their rated efficiencies. The evalaution team supports the PAs planned effort, although this study did not assess the design or effectiveness of this effort.

Considerations & Key Supporting Findings

Shift the baseline for boilers more than 2,000 MBH in size to a custom approach.

- While this study focused on boilers less than 2,000 MBH in size, the final rulemaking for commercial packaged boilers increases the minimum combustion efficiency from 82% to 85% effective in 2020 for gas hot water boilers between 2,500 and 10,000 MBH in size. However, the ongoing existing building market characterization study estimates that only 25% of >2,000 MBH gas hot water boilers installed since 2009 are high-efficiency models. Therefore, the evaluation team recommends that the programs consider shifting the baseline assumption for >2,000 MBH models from 80% efficiency to a custom analysis, depending upon the circumstances of the particular application.

Incentivize contractors to test combustion efficiency.

- Several manufacturers suggested that the program offer a small incentive to contractors to conduct and provide the results of a combustion efficiency test. This testing would provide data to assess the extent of the issue regarding condensing boilers not achieving rated efficiencies, in particular for replacement situations. The evaluation team recommends this suggestion be taken under consideration, however further research into the feasibility of this approach is necessary.

For full report see: Massachusetts Gas Boiler Market Characterization Study Phase II Final Report on the EEAC website, http://ma-eeac.org/studies/

Gas Boiler Market Characterization Study Phase II Report Summary (cont.)

Comprehensive Findings and Recommendations Matrix

Recommendations	
Recommendation 1	*Raise the baseline assumption from 80% to 85% efficiency for boilers less than 2,000 MBH in size.*
Recommendation 2	*Offer a tiered rebate structure for all program-eligible models.*
Recommendation 3	*Continue with the planned contractor education effort.*
Consideration 1	*Shift the baseline for boilers more than 2,000 MBH in size to a custom approach.*
Consideration 2	*Incentivize contractors to test combustion efficiency.*

Recommendations	Recommendation 1	Recommendation 2	Recommendation 3	Consideration 1	Consideration 2
Findings					
Market Characterization					
High-efficiency boilers are widely available in the market.	X	X			
The market for gas boilers in Massachusetts is shifting towards high efficiency.	X	X		X	
System design is a key factor in achieving rated efficiencies for condensing boilers, in particular for replacement situations.			X		X
Manufacturers indicated that training contractors on system design and installation is essential.			X		
Federal Rulemaking					
The final rulemaking from DOE increased the federal minimum standard to 84% efficiency for 300 to 2,500 MBH gas hot water boilers and to 85% efficiency for 2,500 to 10,000 MBH gas hot water boilers effective in 2020.	X	X		X	
Prescriptive Gas Boiler Program					
Several manufacturers suggested that the program offer a small incentive to contractors to provide the results of a combustion efficiency test.					X