EVERSOURCE

January 18, 2018

Lisa A. Skumatz, Ph.D.
Skumatz Economic Research Associates (SERA)
762 Eldorado Drive
Superior, CO 80027

RE: R1613/1614 CT HVAC and Water Heater Process and Impact Evaluation Report and CT Heat Pump Water Heater Impact Evaluation Report

Dear Dr. Skumatz,

Eversource Energy ("Eversource") is pleased to submit these written comments regarding the draft evaluation report: *R1613/1614 CT HVAC and Water Heater Process and Impact Evaluation Report and CT Heat Pump Water Heater Impact Evaluation Report*, Review Draft ("Draft Report"), submitted December 22, 2017 by West Hill Energy and Computing, Inc. ("Evaluator"). Eversource received the Draft Report on January 4, 2018 with a request to provide comments by January 18, 2018. Per the Energy Efficiency Board Evaluation Road Map Process, these comments are for consideration for inclusion in the Final Report.

This study of the Upstream HVAC and Water Heating Program, and the Heat Pump Water Heater Program, had the following objectives: (1) evaluate gross energy savings, peak demand reduction and realization rates for the evaluated measures; (2) recommend changes to the Program Savings Document (PSD); (3) determine net-to-gross (NTG) ratios for the evaluated measures; (4) assess the effectiveness of program processes. The study included billing and AMI analysis, equipment metering, review of manufacturers' data, and interviews with customers, contractors and distributors.

Comments on Recommendations

Eversource appreciates the comprehensiveness of the study and the detailed report, and has incorporated the preliminary results for gross savings in the most recent PSD update, and will incorporate the final net savings results in the next update. Eversource also appreciates the Evaluator's efforts to identify opportunities for program improvements, and offers the following comments on the Draft Report recommendations:

- **Improve Program Tracking.** Shifting to an upstream model provides many benefits in streamlining program delivery, but comes with challenges in tracking and obtaining end user data from distributors or retailers—some of which are unwilling to provide these data. Nevertheless, in 2017, after the program years that were evaluated for this study, Eversource took steps to improve the availability of customer end user data, such as tying a portion of the incentive to customers providing their contact information. We will

continue efforts to enhance data quality, but are mindful of the recommendation below regarding rebate processing time, which can be negatively affected by additional data collection and validation requirements.

- **Improve Communication on Rebate Processing.** Eversource values our partnership with distributors and appreciates the findings about distributor satisfaction with rebate processing. We note that our contracts with distributors specify the timing for providing rebates, and this timing may be extended due to issues with the quality of data that distributors submit. Given the prior recommendation, we will consider options for improving speed and communication around rebate processing, while maintaining data quality.
- **Expand Contractor Training.** Eversource appreciates the findings and specific recommendations on contractor training, and will look for opportunities to expand training to increase technical and program knowledge.
- **Encourage Distributors to Stock Replacement Parts.** Eversource appreciates the findings regarding contractors concerns about the availability of replacement parts, and we plan to work with distributors to address these concerns.

Impact Evaluation Samples, Precision, and Confidence Intervals

The evaluated savings from the impact study, including gross and net savings presented in Table A-2, ES-4, and in other sections of the report, do not include precision and confidence intervals. Page 1-1 states that "the gross impact evaluation meets or exceeds…the requirements of the New England Independent System Operator (ISO) for sales into the Forward Capacity Market (FCM)." These include requirements for sampling, including sample sizes, relative precision and confidence intervals, and descriptions of sampling methods. Please provide these details, including the precision and confidence intervals for the key impact results. In addition, as noted below, sampling bias has the potential to influence the NTG results. Please describe any steps taken to minimize sampling bias.

Net-to-Gross Analysis and Findings

Eversource has significant concerns that the NTG analysis described in the Draft Report led to overestimated free-ridership values, which would unfairly penalize the program going forward. These concerns are as follows:

- The detailed customer survey for boilers included in appendix A asked the following free-ridership question: "Would you have purchased the same <EQUIPMENTA> if the cost were $400 more than you paid?" Boiler rebates were $750 during the evaluation period, not $400. Asking customers about a $400 price difference would result in meaningfully higher free-ridership estimates than if the correct rebate amount were used. Since the appendixes did not include the customer survey instrument for several other measures, and we were not provided with survey instruments for review during the evaluation, we do not know whether the same problem occurred with furnace or other measures' free-ridership estimates. We would like these issues to be corrected or explained in the final report.

- There are several findings from the process evaluation that are at odds with the high free-ridership values from the NTG analysis. It would be helpful if the final report could reconcile or explain these divergent findings.
    - *Distributors*. Figure 6-3 shows that 77% of distributors said the availability of rebates was very important, and 20% said it was important, in their decision to sell high efficiency HVAC units. Despite this, according to table 5-11, the NTG analysis found that distributors attributed only 19% and 29% of boilers and furnaces they stock, respectively, to the program.
    - *Contractors.* The process evaluation found that "the clear majority of contractors felt that the rebate made them much more likely to recommend high-efficiency units, and only 2% of contractors felt that the availability of the rebate had no impact on their likelihood to recommend high-efficiency units." Figure 6-10 shows that 75% of contractors reported that the rebate supported them in selling more high efficiency equipment by reducing equipment prices, 46% reported the rebate supported sales by leading customers to ask for the rebate, and only 3% (1 of 35 surveyed contractors) responded that the program did not support them in selling more high efficiency equipment. Despite this, the NTG analysis found that contractors attributed only 27% of boilers, furnaces, and HPWH they installed to the program, according to table 5-11.
    - *Customers.* Figure 6-6 shows that 76% of customers reported that paying the premium for high efficiency was a major barrier to their purchase of high efficiency equipment (before receiving the incentive). For the NTG analysis, customer free-ridership values were based on self-reports of what equipment they would have purchased in the absence of a rebate. However, on page 6-12, the report states that "of the 40 contractors who responded to the question, only 15 (38%) said that they offer standard options as a regular practice." Therefore, many customers could be unaware of the lower cost, lower efficiency units available, which would influence their free-ridership values by increasing the number of respondents reporting that they would buy high efficiency units without the rebate.

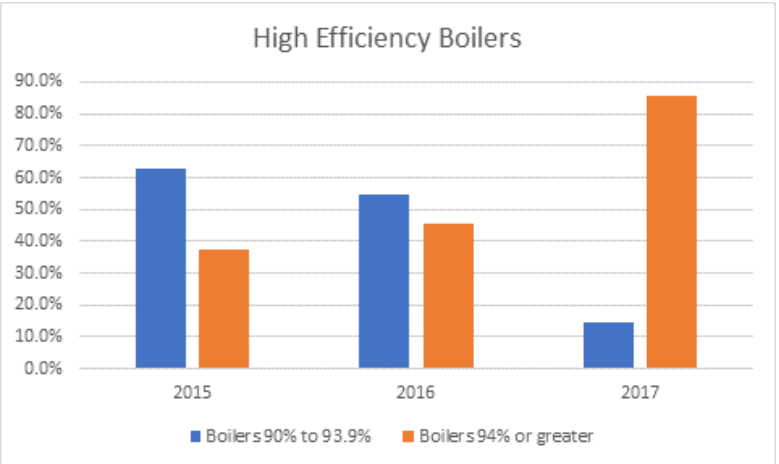
- The sample of contractors and distributors appears to have significant limitations, which likely affected the NTG analysis. As the report notes, the contractor sample size was far smaller than expected due in part to a low response rate. Table 5-9 shows that the NTG findings for a given measure are based on responses from only 6 or 7 contractors—a very small portion of the 270 contractors who installed more than 20 units through the program, and an even smaller portion of the 4,000 total participating contractors noted on page 6-3 of the report. However, the report does not provide precision levels, confidence intervals, or survey response rates. Moreover, it does not describe any steps taken to minimize bias in the sample. For instance, it is possible (or perhaps likely) that the relatively small percentage of contractors who responded tended to serve customers in areas with greater demand for energy efficiency, resulting in higher baselines and higher free-ridership relative to non-surveyed contractors. There is also no information on potential bias among the 30 distributors who responded to the survey, relative to the

18 who did not. The report would benefit from additional information on precision levels, confidence intervals, and potential sample bias.

- There were ranges in NTG findings for the same measures between the self-report method used and the alternative "barriers" method, underscoring the subjective nature of this analysis, and raising questions on the reliability and precision of the results. Table 15 shows NTG ratios were 41 and 36 percent, respectively, for furnaces and boilers using the self-report method, and 52 and 47 percent respectively using the barriers approach. The boiler circulating pump NTG ratios also differed by 20 percentage points between the two methods. The report did not explain these differences or why the self-report method was ultimately used for the results, rather than the barriers method.

- The free-ridership questions may have led to overstated free-ridership levels. For example, contractors and distributors were asked: "If the upstream rebates were not available, what percentage of all <EQUIPMENTx> units you install in Connecticut would meet the current eligibility requirements for the upstream rebates?" Asking respondents to estimate this percentage may result in inflated estimates of high efficiency units, due to the influence that EnergizeCT has had on the market. Contractors and distributors exist in a market where demand for efficient equipment has grown over time in part due to the program—so their responses may be biased toward that higher efficiency reality. If the question asked them to imagine a world in which our programs never existed, free-ridership estimates would likely be lower.

- In 2015 and 2016—the years evaluated for this study—the boiler rebate was $750 for all units with efficiencies of 90% or greater. In 2017, a tiered rebate was instituted that gave a $450 incentive for 90% to 93.9% boilers, or $750 for boilers with efficiencies of 94% or greater. When this change was made, the percent of boilers of 94% or greater doubled. The figure below shows the impact of the tiered incentive in driving customers to higher levels of efficiency.



These data are at odds with the free-ridership results from the study, and show that although there may be "partial" free-riders at one efficiency level—such as 90% efficiency boilers—the program's use of tiered incentives can cause such customers to adopt higher levels of efficiency, resulting in savings that are attributable to the program. The final report could provide additional insight on this issue if it can explain how NTG ratios might be different in 2017 given the current boiler incentive tiers.

Eversource appreciates the evaluator's efforts on the NTG analysis, and expects that some level of free-ridership exists in the Upstream HVAC and Water Heating and Heat Pump Water Heater Programs, despite the above concerns. We note that the Draft Report did not recommend actions specifically to mitigate free-ridership. Greater insight into the factors driving free-ridership, the market actors or segments where free-ridership is most significant, or the types of incentive structures or program delivery mechanisms that can mitigate free-ridership would help inform program adjustments to address this issue. Based on experience in other programs, responding to high free-ridership by reducing incentive levels may only exacerbate the problem, since smaller incentives are even less likely to convince someone to purchase high efficiency equipment who wasn't already planning to do so. Eversource would appreciate any further insight or recommendations the evaluators can provide on addressing free-ridership.

Other Comments

Finally, regarding Figure 1 from Appendix C showing rated and metered boiler efficiencies, the findings are surprising in that they show higher metered efficiencies for lower rated boilers. We would appreciate any information that could be provided, such as the models of the metered boilers, or other details that could provide some insight into this unexpected result.

Eversource appreciates the opportunity to provide comments. Please contact me with any questions you may have.

Sincerely,

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