



June 19, 2019

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

**RE: R1603 Connecticut Home Energy Solutions Billing Analysis, Draft Report**

Dear Dr. Skumatz,

Eversource Energy (“Eversource”) is pleased to submit these written comments regarding the draft evaluation report: *R1603 Connecticut Home Energy Solutions Billing Analysis, Draft Report* (“Draft Report”), submitted May 22, 2019 by West Hill Energy and Computing (“Evaluator”). Eversource received the Draft Report on June 5, 2019 with a request to provide comments by June 19, 2019. Per the Energy Efficiency Board Evaluation Road Map Process, these comments are for consideration for inclusion in the Final Report.

The Draft Report presents the results of a billing analysis conducted to evaluate the impact of the Home Energy Solutions (HES) and Home Energy Solutions-Income Eligible (HES-IE) programs during 2015 and 2016. Evaluated program savings were estimated from analysis of program participants’ electric and gas consumption before and after their participation in the programs. These estimates also accounted for consumption of non-participating customers<sup>1</sup> over the same period. The billing models incorporated weather and measure groups as predictor (independent) variables, and also accounted for timing variables to capture any widespread changes in energy use over time.

General Comments on Draft Report Findings

Eversource appreciates the evaluator’s efforts to rigorously model the energy savings of HES and HES-IE participants, and we generally agree with the recommendations. However, we have several overriding concerns about the analysis methods and the savings results as they were presented in the Draft Report.

**Net vs. gross savings.** It was not clear from the Draft Report whether we should interpret the savings results as net or gross savings and the explanation of the billing analysis model was not clearly understandable to a non-statistician. However, since the billing analyses included a future participant comparison group, it presumably reflects some naturally occurring efficiency (e.g., installation of LEDs) among this group and the results could be interpreted as net savings.

**Results for HES and HES-IE.** HES and HES-IE are different programs that involve a systematically different group of participants, housing stock, baselines, and behavioral

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<sup>1</sup>“Future” HES participants—those that participated in 2017-18—were used as the comparison group for the 2015-16 participants, as these customers are likely to be the most similar to participants during the evaluated period.

characteristics. Even if the results are similar, reporting them separately for each program could provide insight into any differences there may be.

**Results by heating type.** Although most electric projects are for electrically-heated homes, many of these projects would have occurred at oil and propane heated homes, which may be systematically different in size and tightness compared to electrically heated homes. Separating results by heating type could provide valuable insight into program performance.

**Lighting results.** We have several concerns with the results of the analysis regarding lighting.

- The report states that the PSD baseline is an incandescent lamp but the actual baseline is likely to be a combination of CFL, halogen, and incandescent. However, in line with the PSD, Eversource HES-IE program rules during the 2015-16 period of review required that only incandescent or halogen bulbs be replaced—the rules prohibited LEDs replacing CFLs. Based on the description of the billing model, it is unclear if this issue would have affected the modelled savings results—regardless, it should be clarified in the report and considered in interpreting the billing analysis results.
- The comparison to the evaluation of the 2011 HES program<sup>2</sup> is misleading. First, the statement that the 2015-16 reported lighting savings per bulb were 40% higher than cited in the 2011 evaluation is inaccurate. The 2011 evaluation found lighting savings per house of 782 kWh, after applying the 120% realization rate. The 903 kWh savings per home reported in 2015-16 represents only a 15% increase over the 2011 evaluated savings value. Further, this increase can be explained in part by the fact that 2015-16 program bulbs included LEDs, while 2011 program bulbs were only CFLs. In addition, 2011 evaluated savings were 42 kWh/bulb, and the 2015-16 program-reported value was 54 kWh/bulb, an increase of 29%. This corresponds almost exactly with the increase in efficiency from a 13W CFL to a 9W LED (31%).
- The use of EIA data on lighting consumption is problematic for several reasons. First, EIA data is generalized, includes both single and multifamily, and does not account for the fact that single family homes in CT are larger on average than other homes in the region. In addition, it is not clear what year of EIA data was used for this analysis—however, the data would presumably include a portion of efficient lighting that had previously been installed either as part of efficiency programs or by customers acting outside of programs—which again raises the question of whether the results reflect net or gross savings.
  - Notably, the most recent CT LED lighting study found that CT homes at the time (2015) had annual lighting usage of 2005 kWh—more than double the EIA estimate of 992 kWh cited in the Draft Report.<sup>3</sup> It also found that “if all inefficient sockets were changed to LEDs, Connecticut homes could potentially save 983 kWh per household, in addition to any savings from EISA.” This estimate is very close to the 903 kWh in lighting savings per home reported by the programs, and raises further questions about how to interpret these results.

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<sup>2</sup>The Cadmus Group, Inc. Impact Evaluation: Home Energy Services. December 2014

<sup>3</sup>NMR, Connecticut LED Lighting Study Report (R154), January 2016. See Section 7.  
[https://www.energizect.com/sites/default/files/R154%20-%20CT%20LED%20Lighting%20Study\\_Final%20Report\\_1.28.16.pdf](https://www.energizect.com/sites/default/files/R154%20-%20CT%20LED%20Lighting%20Study_Final%20Report_1.28.16.pdf)

**Electric savings for envelope and fossil fuel heating measures.** The report in several places refers to air sealing, insulation, and duct sealing as “heating measures,” and states that “it is not clear why electricity savings would be reported for any envelope measures in homes not heating with electricity.” These are shell measures, not heating measures, and they can include electric savings associated with cooling (as well as heating), as described in the PSD.<sup>4</sup> In addition, as described in the PSD, the programs also claim auxiliary electric heating savings for furnace fans.<sup>5</sup> There are several statements in the Draft Report on this that should be corrected.

**HVAC installations coincident with HES participation.** The programs target customers for HES who have recently installed HVAC systems through our other programs, and so there is a higher likelihood of new air conditioning load (or possibly electric heating load from heat pumps) being added around the time of HES participation. This has the potential to significantly impact the billing analysis results, and may partially explain why the expected amount of air conditioning savings were not observed in the billing analysis. Please clarify how this may have impacted the results, or adjust the analysis to the extent possible to account for this.

### Comments on Recommendations

Eversource offers the following comments on the Draft Report’s recommendations:

- **Options for future evaluation work.** Eversource appreciates the opportunity to provide input on this issue. Based on the results of the draft billing analysis, we believe investigating the causes of low realization rates is a critical area of study that is needed to get program improvement value out of the billing analysis. However, we are unsure whether the proposed method of “stress testing” PSD formulas would allow a full understanding of what is happening at homes to drive these realization rates, and would request further discussion of the best methods for understanding these drivers. We also agree that the multifamily component of HES is a potentially valuable area of study, but are unsure what methods are best suited to address the challenges unique to this segment that West Hill has already encountered, and would request further discussion of the proposed methods for this analysis.
- **Standardize measure categories.** We agree in principle that measure categories and descriptions should be standardized in program data, but we would like to better understand what issues were present in the data by utility and by measure category. This would help us to target improvements.
- **Ex ante savings calculations.** We agree that program tracking data should include *ex ante* savings calculations. Since the 2015-16 period covered by this review, Eversource has improved this functionality in our tracking system and the HES mobile application, and savings inputs for all HES and HES-IE core and add-on measures are now captured in our program tracking data.

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<sup>4</sup>See chapters 4.4.4 (Infiltration Reduction Testing (Blower Door Test)) and 4.4.14 (Wall Insulation) of the PSD, at [https://www.energizect.com/sites/default/files/2017%20CT%20Program%20Savings%20Document\\_Final.pdf](https://www.energizect.com/sites/default/files/2017%20CT%20Program%20Savings%20Document_Final.pdf)

<sup>5</sup>See references to “fossil fuel heating with air handler unit”, in chapters 4.2.9 (Duct Sealing) and 4.4.4 (Infiltration Reduction Testing (Blower Door Test)) of the PSD, at [https://www.energizect.com/sites/default/files/2017%20CT%20Program%20Savings%20Document\\_Final.pdf](https://www.energizect.com/sites/default/files/2017%20CT%20Program%20Savings%20Document_Final.pdf)

- **Multifamily project details.** We generally agree with the recommendation to track project details for all multifamily dwelling units in our program tracking database. However, linking project details for all dwelling units at a site to our billing and customer systems is a manual, resource-intensive process. We are exploring how to cost-effectively accomplish this given resource constraints.
- **Unique IDs in tracking data.** We agree that sites, projects, and measures should have unique identifiers in tracking data. For multifamily projects, there are some challenges to implementing this as noted above, but for single family projects, the current site IDs, project IDs and measure IDs in our database are unique values that should allow for accurate evaluations.

Thank you for the opportunity to provide comments.

Sincerely,

*Miles Ingram*

Miles Ingram  
Sr. Analyst, Energy Efficiency, Eversource  
Miles.Ingram@Eversource.com  
860-665-2441