



UIL HOLDINGS CORPORATION

157 Church Street, New Haven CT 06510-2100
203-499-2000

January 19, 2016

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

Re: R91 Review of Impact Evaluation Best Practices Draft

Dear Ms. Skumatz:

The United Illuminating Company ("UI") hereby submits the following comments on R91 Review of Impact Evaluation Best Practices Draft, dated December 22, 2015 with a request to provide comments by January 18, 2016.

This evaluation project was proposed by the Evaluation Administrator as an effort to follow up on the large number of questions the Companies had on R16 HES and HES IE Evaluation. The Statement of Work proposed this evaluation would include these key outputs:

- Advice on best practices for impact evaluation approaches, including for oil and propane customers, and
- Feedback on the drivers underlying the gas realization rates in Connecticut's recent impact evaluation, potentially including information useful to planning and PSD inputs where feasible.

The Companies are disappointed in the lack of information provided by this report that could be useful to the planning and PSD inputs.

The report provides a variety of conclusions and recommendations. Some comments follow:

Recommendation 1:

Update simulation models for air and duct sealing. Revise models to use hourly-iterative simulation software and draw upon participant home characteristics, differentiating between different building, customer, and HVAC types to award the most appropriate savings. Calibrate model prototypes to participant data to ensure that typical consumption patterns of Connecticut customers are reflected in savings computations. In future evaluations, ensure evaluators and PSD developers use an hourly-iterative software package that uses default assumptions and load shapes that are appropriate for residential applications (e.g., BEopt).



Currently the PSD Uses data gathered from RemRate which is a highly regarded Energy Star residential energy analysis, code compliance, and rating software to determine the amount of energy stored per CFM for different HVAC types. The Company believes that there is no reason to switch software types, especially to something more complicated such as a time-dependent modeling software where after many iterations the Company would just take the average REM value.

In the case of Duct Sealing the home size and type do not matter because the duct is treated as a separate thermodynamic system, independent of the surrounding household.

In the case of Air Sealing the PSD already differentiates calculations for home types and sizes. Single family homes the blower door test arrangement does not vary enough for in order to break single family homes up into different categories. Measuring infiltration and infiltration reduction of Multi-Family Buildings is challenging because of the diverse size and configurations. The Multi-family blower door factor adjusts the savings to take into account the diverse multifamily projects.

Recommendation 2:

Account for interactivity between HVAC and envelope measures. Individual measure savings are lowered if installed concurrently; for example, performing duct sealing increases distribution efficiency so that if attic insulation is then installed, heating load drops by a much smaller amount than it would if ducts remained leaky. To account for this interactivity, make an adjustment to reduce savings when multiple shell- or duct-improvement measures are implemented through the program.

The HVAC systems in the PSD use assumed loads as a function of Equivalent Full Load Hours that are generated using base load studies. The large sample size studies were averaged to create an approximation of the base load in an average home; taking into account that broad range of initial conditions that might occur.

Recommendation 3:

- **Consider whether additional weather and location assumptions can improve savings estimates.** The PSD currently uses only a single weather profile to estimate weather patterns that influence savings, which may not reflect the geographic distribution of participants across the state. Areas where a large number of participants are identified (e.g., Bridgeport) have notably lower HDDs than reflected by the statewide average or Hartford weather profiles.



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The Connecticut PSD references two bins of weather data for energy calculations. Currently the Company calculates energy savings in southern most areas of the state using Bridgeport data, and Hartford data in the central and northern areas. The Company will look into a solution to mitigate the losses in areas of the state whose climate differentiates from Hartford or Bridgeport significantly.

Recommendation 4:

- **Verify that heating HVAC efficiency assumptions remain valid.** Current gas and oil furnace efficiency assumptions are lower than the federal standard and current market conditions, which may artificially increase savings. Lower furnace efficiencies require greater HVAC energy consumption to meet winter set point temperatures; therefore, measures such as insulation, air sealing, and duct sealing, which reduce heating load, have an amplified effect. Furnace efficiency assumptions influence savings calculated both through building simulation and through the algorithmic approach applied for insulation measures.

The efficiency assumptions in the PSD are less than the minimum federal standard. The value that the evaluator is referring to is the 75% system efficiency used in calculating the REM/Rate for Duct Sealing. The federal standards are based off the AFUE of the equipment; the PSD is referring to total system efficiency which includes losses from distribution (piping or duct), so it would make sense that the number is less than a calculated AFUE. The Company also requests the evaluators send over the market studies that they are referring to.

Recommendation 5:

Update the HDD adjustment factor for insulation measures. For attic and wall insulation savings, the current HDD correction factor, which draws from ASHRAE's 1989 handbook, may be outdated. An updated value is not provided in more recent versions of this handbook. Transparency should be provided in what this value seeks to represent.

The correction factor is how ASHRAE adjusts for errors in the established 65°F-based method. ASHRAE has not changed this Degree Day calculation method since 1988.

Specific comments to the evaluation are provided below:



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Page 3-4, it is worth noting that not only performing Building Simulations requires a skilled user but when reviewing the simulations it is important to have someone who is familiar with building simulation software.

Page 27, Figure 3 is a little more difficult to read without gridlines.

Page 55, table 10, if not already listed in the R19 study the utility requests a list of all the homes used in the study in including the details on the home used to make the calculations and run the simulations (location, home type, size , HVAC type, etc.).

Page 61, Figure 15, label the Y axis for clarity

Overall the Company was hoping for more of an in-depth statistical analysis and less of a literature review.

Thank you for the opportunity to provide these comments.

Very truly yours,

A handwritten signature in black ink that reads "Patrick McDonnell". The signature is written in a cursive, flowing style.

Patrick McDonnell

Director of Conservation and Load Management