



UIL HOLDINGS CORPORATION

157 Church Street, New Haven CT 06510-2100

January 31, 2014

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

Re: UIL Review of the Revised Draft "Weatherization Baseline Assessment, NMR Group Inc., January 3, 2014

Dear Ms. Skumatz:

The United Illuminating Company ("UI"), Connecticut Natural Gas Corporation ("CNG") and The Southern Connecticut Gas Company ("SCG," and with UI and CNG, the "Companies"), hereby submits the following comments on the Revised Draft "Weatherization Baseline Assessment", NMR Group Inc., January 3, 2014. The revised draft was submitted to UI on January 3, 2013 with comments to be provided by January 31, 2014 per a 2 week extension granted by the CT EEB Evaluation Committee.

The primary objective of this study is to determine the percentage of single-family residential units in Connecticut currently meet the state weatherization standard. The study included both single-family detached (i.e., stand-alone) and single-family attached (e.g., duplex or townhouse) homes.

Secondary research objectives in this report include the following:

- Detail what percentage of single-family homes with various characteristics (e.g., low income vs. non-low income, fuel oil vs. natural gas heated homes, etc.) fall above and below the weatherization threshold.
- Characterize the weatherization-related features of single-family homes in Connecticut.
 - Detail the characteristics of homes' thermal envelopes (wall insulation, ceiling insulation, air infiltration, duct leakage, etc.), including visually inspecting homes' thermal envelopes using infrared cameras.
 - Detail the characteristics of homes' heating, cooling, and water heating equipment.
 - Detail the characteristics of other energy-related features (e.g., appliances).

After a review of this revised draft study, the Companies feel that the evaluation vendor has presented a draft report that is well organized and provides results that the Companies can use to improve future program design and performance. As no weatherization results have changed, it appears that the vendor has addressed initial concerns by the Companies and added additional technical details used to determine results and in the formularization of recommendations.

UIL would also like to stress the importance of a performance path for evaluating a whole "house as a system." All homes are different and have different opportunities and obstacles that impact cost-effectiveness of energy saving measures. The importance of the performance path was also highlighted at a DEEP Technical Hearing held in December of 2012 where comments were solicited about the draft Weatherization standard in general, as well as the use of a prescriptive vs. performance path, or even a hybrid prescriptive and performance based methodology for evaluating homes. In any review of software options for assessing compliance using the performance-based approach, it is important that the cost



associated with using the software to assess home performance is considered in any decision since this cost can be a significant barrier.

In the draft report; Figure ES-1 on page III shows the planned and actual sample of homes by income, ownership and heating fuel. For some reason the vendor include gas homes in with "All other Heating Fuels" with a footnote about # of gas homes. Since the gas program is separate program interim of budgets and reporting, the companies believe that these gas homes should be listed out separately in this table. Given our funding structure and program funding it might be best to list out, electric, gas, oil and other fuels to best align these results with program implementation.

Page XVI of the report provides new and revised recommendations to the EEB and the companies based on the initial draft comments. As for these recommendations, the majority are programmatic changes which are not typical outcomes from a baseline study. The primary objective of this study was to determine what percentage of single-family homes in CT meets the weatherization definition and the secondary objectives were to inform on home characteristics. The Companies feels that programmatic recommendations are not appropriate as an outcome from a baseline assessment.

In review of the vendor recommendations, we noticed that vendor only directs comments and recommendations to the HES program. Since the study included low income customers in its sample as well, are these recommendations inclusive of HES-IE or solely directed to HES program. Please clarify since both programs are administered, funded and tracked separately it is important to clarify exactly what the vendor means when they say HES in these comments.

The below are UIL responses and comments to the vendor recommendations.

Weatherization Standard

Conclusion: Classifying basements as "conditioned" or "unconditioned" can be challenging in existing homes and as a result is often left to the discretion of the auditor. The final classification can have a significant impact on the compliance of homes with the weatherization standard as multiple measures address basement insulation and the designation of a basement as "conditioned" or "unconditioned" influences the results of diagnostic tests (i.e., air and duct leakage tests).

Recommendation: The EEB should consider the best way to address basements in the weatherization standard. The current standard suggests that homeowners should insulate the frame floor separating a conditioned first floor from an unconditioned basement. In some cases, this suggestion may be contradictory to sound building science. Additionally, there may be limited cost-effective savings from insulation retrofits in these cases as the temperature change is typically not that dramatic between a first floor and a basement. Moreover, insulation installation in these applications can be challenging due to wiring and plumbing penetrations.

UIL Response: *The Companies agree with this vendor's recommendation to the EEB. The insulation of framed floors over an unconditioned space is a reoccurring theme and area of concern as highlighted in this study.*

Conclusion: It is nearly impossible for an auditor to verify the presence, type, and R-value of slab insulation in existing homes.

Recommendation: The EEB should consider removing the slab insulation requirement that exists in the current draft weatherization standard. The majority of homes in the State are older homes that likely lack documentation on the presence and level of slab insulation. As a result, any assessment of slab insulation, when addressing progress towards the 80% weatherization requirement, will likely be based on general assumptions as opposed to visual verification.

UIL Response: *The Companies agree with this vendor's recommendation to the EEB.*

Conclusion: Compliance is high for certain measures (e.g, 82% for windows and 81% for attic duct insulation) and low for others (15% for frame floor over unconditioned basements and 34% for flat ceiling insulation).



Recommendation: The EEB should review the current standard definition and consider revisions to the efficiency levels required by the standard based on the study results. Although the EEB should review the entire standard, the Team suggests paying particular attention to basements and frame floors. The information provided in the main body of the report will assist this review and potential revision.

UIL Response: *The Companies agree with this vendor's recommendation to the EEB. The insulation of framed floors over an unconditioned space is a reoccurring theme and area of concern as highlighted in this study.*

Conclusion: The current standard only addresses frame floor insulation over unconditioned basements and excludes frame floors located over other unconditioned spaces such as garages and ambient conditions. Additionally, the current standard does not address rim joist insulation which is an important component of building envelopes.

Recommendation: The EEB should consider adding details to the current standard that address all frame floor locations that are located over unconditioned space (e.g., conditioned to garage frame floor locations, conditioned to ambient frame floor locations, etc.). Similarly, the EEB should consider adding a requirement to the standard that addresses rim joists.

UIL Response: *The Companies agree with this vendor's recommendation to the EEB.*

Program Opportunities

Conclusion: Statistical modeling reveals that participation in the HES program, the age of homes, and whether homes are heated primarily by electricity are the most significant predictors of whether or not homes meet the weatherization standard. Of these three, the age of home serves as the strongest predictor of weatherization status.

Recommendation: The HES program should target non-electrically heated homes built prior to 1980, regardless of household income. The program should prioritize those homes that have not yet taken part in the program. Targeting non-electrically heated homes is the best way to increase compliance with the weatherization standard, but HES should continue to pursue energy saving opportunities (e.g., heat pumps replacing electric resistance heat) in the electrically heated homes that do take part in the program even if these opportunities will not greatly increase compliance with the weatherization standard.

UIL Response: *The Companies can understand why the vendor recommends targeting non-electrically heated homes built prior to 1980 based upon the results of the sampled program. Although this market segment is small, there is still good potential for savings in the remaining electrically heated homes and this segment should not be ignored as we strive towards the state mandated goal of 80%.*

Conclusion: One out of every five homes (20%) that heat primarily with natural gas have uninsulated exterior walls.

Recommendation: The Companies should ensure that HES vendors are discussing wall insulation upgrades with homeowners, particularly in homes with uninsulated wall cavities. The Companies may want to consider whether the current incentive and financing options adequately induce adoption of wall insulation upgrades by households with by natural gas.

UIL Response: *As part of the current HES program, vendors discuss and recommend insulation when the recommendations are appropriate for the customer and continue to focus on ways to promote insulation. Effectiveness of incentive levels or financing was not part of this study.*

Conclusion: Air leakage, flat ceiling insulation, and conditioned to ambient wall insulation are significantly less efficient in performance-based non-compliant homes than in compliant homes.

Recommendation: The Companies should continue to focus on air infiltration reductions during initial HES visits and continue to have HES vendors offer flat ceiling and wall insulation upgrades where applicable. Likewise, the Companies may want to consider whether the current incentive and financing options adequately induce.



UIL Response: The Companies agree on the importance of reducing all types of air infiltration into visited homes during the initial visit and continuing to promoting insulation when appropriate.

Conclusion: Inadequate basement insulation—primarily conditioned to unconditioned basement frame floor insulation—and foundation wall insulation are contributing factors to the low performance-based compliance with the weatherization standard.

Recommendation: Increasing basement insulation, specifically conditioned to unconditioned basement frame floor insulation, will likely increase compliance with the *current* weatherization standard. The Companies could consider increasing the focus on basement insulation during initial HES visits and encourage homeowners to insulate their basement at either the foundation walls or the frame floor if increasing compliance with the current standard definition is a priority.

UIL Response: The Companies recognized this need and have since screened and added this measure to the 2014 CT PSD.

Conclusion: The use of infrared cameras would help vendors with their retrofit efforts, particularly when it comes to air sealing.

Recommendation: The Companies should consider requiring and/or recommending that HES vendors utilize infrared cameras during HES visits. The use of these cameras would likely increase air infiltration reductions and help increase compliance with the weatherization standard.

UIL Response: Currently some HES Vendors do utilize infrared cameras to locate cold and hot spots in a home's shell due to insufficient insulation and/or poor weather-stripping. Infrared cameras are only useful when there is a temperature differential between inside and outside and are not very useful during the shoulder months. Additionally, they are expensive and require specialized technician training.

Other

Conclusion: Among the 180 homes visited as part of this study, 9% (16 homes) have asbestos or vermiculite present and an additional 4% (7 homes) have mold present.

Recommendation: The Companies currently help address these issues through the healthy homes initiative and health impact assessments. The Companies should continue to work with other agencies to address these issues. The EEB and DEEP may also want to consider the appropriateness of offering financing to HES households and HES-IE landlords and rebates to HES-IE homeowners to fund abatement of these problems with the understanding the recipient would then adopt more energy-savings measures such as insulation or air sealing. It is the opinion of the evaluation team that meeting the 80% weatherization requirement by 2030 without increasing the efficiency of homes with these concerns will be difficult.

UIL Response: The Healthy Homes Initiative grant period that has been assisting limited income customers in the past with asbestos, vermiculite and/or mold issues has currently ended in the state of Connecticut. Under the current CT HES Program, the remediation of asbestos is cost-prohibitive to a project. However, HES vendors are required to have abatement partners and assist the homeowner in getting an abatement quote. In the case of mold, the HES Vendor assists the homeowner to the extent possible in identifying the cause so it may be remediated and prevented from happening again. The Companies will continue to work with other agencies to address these issues.



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Conclusion: The labor required to fully populate a REM/Rate model is significant. REM/Rate requires users to perform intensive area and volume calculations in order to properly populate the model. Additionally, REM/Rate accounts for more variables than many other software options. The result is a thorough and accurate energy consumption estimate for any given model (and the option to analyze a large selection of data).

Recommendation: The EEB should consider the pros and cons of various software options for assessing compliance using the performance-based approach. REM/Rate is a robust modeling tool that produces accurate energy consumption estimates, but it may not be a viable software option if the EEB expects HES vendors to calculate the weatherization status for HES participating homes. Other options such as the DOE Home Energy Score software or a customized spreadsheet based model may be more applicable. There would undoubtedly be a tradeoff of time/cost vs. accuracy should a less robust model be adopted, but these tradeoffs are something the Team believes the EEB should consider.

UIL Response: *The Companies agree with this vendor's recommendation to the EEB. Since study results state that 26% for homes that followed the high performance methodology meet the weatherization definition as opposed to 5% following the prescriptive compliance method, the Companies agree that the EEB should consider various software options for assessing compliance using the performance-based approach. It is also important to note that the cost associated with using a modeling tool to assess home performance can be a significant barrier to the approach and should be part of the review and analysis process when looking at the various software options.*

Thanks you for the opportunity to provide these comments.

Very truly yours,

A handwritten signature in blue ink that reads "Paul M. Gray". The signature is written in a cursive, flowing style.

Paul M. Gray, CEM
Senior Business Development Professional
UIL Holdings Corporation