

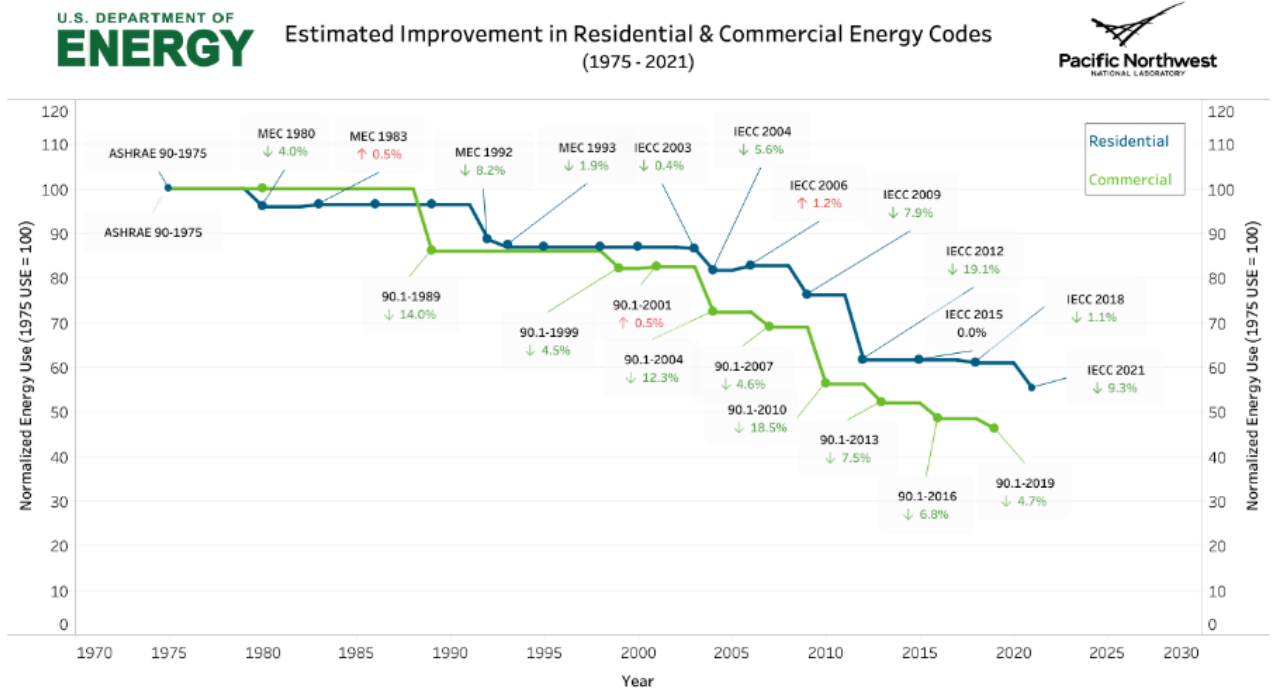
Memorandum

To: Lisa Skumatz, Connecticut Energy Efficiency Board Evaluation Consultant
CC: Emily Rice, CT EEB Executive Secretary
From: Glenn Reed, CT EEB Technical Consultant
Date: May 11, 2023
Re: Technical Consultant comments on the 4/27/23 Draft for Project X1968 – RNC Baseline

Provided below are summary and highlight comments on the April 27 review draft of the RNC Baseline (R1968) Study. These comments supplement those contained in the marked-up draft report that was also submitted. All the comments below are included in the marked-up draft and are provided here as a summary and for emphasis.

1. We understand the challenge in developing a new construction baseline that is reflective of current construction practices and that baseline practices for any given measure may exceed or fall short of code requirements. Further, there is often a lag before updated code requirements are fully adopted by the design/build community. That said, we are perplexed as to why there is no mention at all in the report of the most current energy code that is in force in CT:
 - The new energy code became effective on October 1, 2022. It is likely that most homes built in the upcoming program year (2024) will be built to this new code.
 - The new code is based on 2021 IECC. Based on information from DOE [Infographics | Building Energy Codes Program](#) (see below) it appears that the new code will be considerably more stringent (about 10%) than 2015 IECC, which was the basis for the CT code in effect when the homes surveyed in this study were built.
 - What specific building elements are responsible for this increased stringency?
 - What would be the average HERS rating for a surveyed home if it were built to the new code?

- How should consideration of the new code inform the UDRH, if at all?
- How should the new code inform the timing of the next baseline study?



- One of the report's principal goals was to determine the potential usefulness of accessing building department data to inform future baseline development. For a number of reasons, the report concludes that building department data cannot currently fulfill that need.
 - However, there was no mention of this study activity in either the Abstract or the Executive Summary.
 - Should the report provide a Recommendation or Consideration as to how to improve building department record keeping practices related to energy code provisions?
- The report acknowledges that the new all-electric program design may limit the usefulness of some of this study's findings, including the UDRH. One point raised is the possible need to develop separate UDRHs depending on whether natural gas is available. Why can't this be done as part of the current study?
- The study develops a blended AFUE that includes both heat pumps (except for geothermal heat pumps) and fossil fuel-fired furnaces and boilers. The equation used to

convert AFUE to HSPF includes a 3.16 source-to-site conversion factor which is referenced from the building code. From footnote 9 on page 24:

*The equation used for this conversion was $(AFUE) * 0.03413 * (\text{Source-Site Conversion Factor})$. The source-site conversion factor of 3.16 was derived from section R405.3 of the Connecticut energy code.*

- Please discuss in more detail how the 3.16 factor is used in the code and its derivation.
 - This factor does not seem to have any clear relationship to the current New England generation mix or its average heat rate. Shouldn't that be the basis of this conversion factor?
 - How, if at all, are the individual observed equipment HSPFs and AFUEs weighted to develop this blended average?
5. While this 3.16 source-to-site conversion factor is used to combine electric and fossil fuel-fired space heating equipment efficiency metrics, no such similar conversion is done to develop the blended 1,24 EF for hot water heating equipment. The authors appear to just take a weighted average of the observed EFs with no source-to-site adjustment for fossil fuel-fired water heaters. Why?
6. In the report water heating equipment efficiency is largely discussed in terms of EF (energy factor). However, the current metric for (most?) water heating equipment is UEF (uniform energy factor).
- Why aren't the study results and the UDRH water heating efficiencies presented as UEF values?
 - There is text noting that UEF to EF conversions have been done. What is that conversion?
7. DOE has more recently revised its rating metrics for heat pumps and central air conditioners to HSPF2 and SEER2. For heat pumps, HSPF2 ratings are typically lower than HSPF ratings by 10-15% for the same piece of equipment reflecting a more accurate rating – and lower actual in-field performance – of heat pumps.
- These changes in ratings need to be explicitly discussed in the report.
 - How, if at all, do the UDRH values need to be revised to reflect these new ratings?
8. Throughout the report comparisons are made between values. The authors need to be particularly mindful of noting whether these differences are statistically significant.

For example, in the Abstract, there is text stating that:

This study found a decrease in energy code compliance from the previous study, from 90% to 84%.

Inclusion of this statement in the Abstract strongly implies that this is an important finding, Yet, in the Executive Summary it is noted:

While this decrease is notable, it is not statistically significant

There are other, similar instances in the report where differences in values are reported, but the text is not clear as to whether the changes are statistically significant.