

July 7, 2021

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

RE: X1939 Phase 1 Best Practices Research

Dear Dr. Skumatz,

Eversource Energy (“Eversource”) is pleased to submit these written comments regarding the draft evaluation report: X1939 Phase 1 Best Practices Research (“Draft Phase 1 Report”), submitted June 4, 2021 by TRC (“Evaluator”). Eversource received the Draft Phase 1 Report on June 11, 2021 with a request to provide comments by July 2, 2021. Per the Energy Efficiency Board Evaluation Road Map Process, these comments are for consideration for inclusion in the Final Report.

Phase 1 of the X1939 Early Retirement (ER) Evaluation study involves two activities: 1) conducting a best practice review for data and lifetime savings calculations for measures where existing equipment may be used as the baseline, and 2) developing early retirement program design recommendations. Specific objectives for the Phase 1 report are: (1) ensure that CT programs are accounting for dual baseline calculations where applicable as outlined in the CT PSD, (2) provide feedback on ER program design; (3) ensure that the program is equipped to handle non-energy impact factor considerations for ER projects; (4) optimize the process effectiveness and efficiency for ER programs. The report identified practices and recommendations intended to aid the adoption of dual baseline calculation methodologies and the evaluation of ER programs.

General Comments on Draft Report Findings

Eversource appreciates the evaluator’s work to establish best practices for when and how to apply dual baselines. Eversource is already applying dual calculation methodologies for some commercial and industrial (C&I) and residential measures, as evidenced by using Remaining Useful Life (RUL) for several measures:

- C&I electric chillers
- C&I gas fired condensing boilers
- C&I high efficiency unitary air conditioning and heat pumps
- C&I variable refrigerant flow
- Residential air source heat pumps
- Residential gas boilers
- Residential central air conditioning systems
- Residential natural gas furnaces
- Residential package terminal heat pumps
- Residential appliances (all measures)

Evaluators concur, this is consistent with the information provided in Section 4.4.1 of the report.

In addition, since at least 2016 Eversource CT had a policy included in its Large C&I Energy Efficiency Implementation Manual that to participate in the retrofit program, two conditions must be met:

1. Existing equipment or system must be operational; and
2. Existing equipment's or system's age must less than 75 percent of its new construction/replace on failure lifetime as defined in the PSD. This rule does not apply to lighting or energy management systems. Lighting and energy management systems are not included in the rule because they can be kept functioning through the replacement of components.

Eversource agrees with the evaluators that dual baselines should be used to calculate savings for ER measures. Eversource would like more clarity on the criteria used to determine which measures are affected by that adoption of dual baseline calculations. In addition, Eversource suggests using a survival curve analysis to deem RULs where possible, rather than using the recommended 1/3 EUL assumption.

The survival curve method proposal is addressed below under the more detailed comment.

For the dual baseline expansion, to start with Evaluators recommend adopting dual baselines for the list of commercial measures that currently utilize separate EULs for retrofits and for lost opportunities. This list can be found in Table 3-7 of the report and is shown below.

Table Error! No text of specified style in document.-1. Commercial measures with blended retrofit EULs

Description	Remaining Useful Life	Retrofit ⁸	Lost Opportunity ⁸
Automatic Photocell Dimming System	N/A	9 (a)	10 (a)
Fixture (LED)	N/A	13 (a)	15 (a)
Fluorescent Lighting System Power Reduction Control	N/A	9 (a,*)	N/A
Occupancy Sensor	N/A	9 (a)	10 (a)
Sweep Controls/EMS Based Control	N/A	10 (a,*)	15 (a,*)
Energy-Efficient Motor	N/A	15 (a)	20(a)
2-Speed Motor Control in Rooftop Unit	N/A	13 (a,*)	15 (a,*)
Cooling Tower Alternates	N/A	13 (m)	15 (c/45*)
Dehumidifier	N/A	13 (m)	15 (m)
Economizer - Air/Water	N/A	7 (a)	10 (a)
Energy-Efficient Motor	N/A	15 (a)	20 (a)
Variable Speed Drive	N/A	13 (b,1)	15 (b,1)
EMS/Linked HVAC Controls	N/A	10 (a)	15 (a)
Enthalpy Control Economizer	N/A	7 (a)	10 (a)
New/Additional EMS Points	N/A	10 (a)	15 (a)
Heat Recovery from Refrigeration System	N/A	10 (c/80)	13(m)
Air Compressor	N/A	13 (b,1)	15 (b,1)
Energy-Efficient Transformer	N/A	15 (a,*)	20 (a,*)
Energy-Efficient Motor	N/A	15 (a)	20 (a)
Plastic Injection Molding Machine	N/A	13 (m)	15 (m)
Refrigerated Air Dryer	N/A	13 (b,1)	15 (b,1)
Variable Frequency Drive	N/A	13 (b,1)	15 (b,1)

For residential measures, CT has already adopted dual baselines for 11 measures. This is a good start and Evaluators do not have additional recommendations to expand those measures currently.

Eversource also agrees with the evaluators that early retirement programs have the potential to promote energy efficiency for high capital cost equipment. Based on the interest expressed by DEEP during the preparation of the CLMP 2019-2021 encouraging early retirement of inefficient equipment, Eversource launched its ER Request for Proposal (RFP) programs. Eversource is concerned that the

recommended criteria for participation in ER specific programs may limit participation in the ER RFP program. Since the program will be subject to an impact evaluation as part of Phase 2 of this evaluation, Eversource proposes to hold off implementing these criteria until that evaluation is complete. At that point, participation criteria for the ER RFP program could be informed by additional analysis of participating projects.

Evaluators agree that the participation criteria can be confirmed upon completion of Phase 2 of this evaluation.

Lastly, Eversource is concerned that the proposed cost effectiveness testing approach for the early retirement program may not be feasible in Connecticut, and seeks clarification about the applicability of the Deferred Replacement Credit method recommended in the literature for use in CT.

Evaluators have not recommended changing the cost effectiveness screening at this time, as this review was beyond the scope of this evaluation. Clarification on this question is provided below under the more detailed comment

Additional details are provided below. To the extent that these comments can be addressed, Eversource anticipates incorporating the new information provided in the Final Phase 1 Report to update measure-level calculations and implement program improvements as suggested.

Comments on Recommendations

While Eversource appreciates the research and information provided in the Draft Phase 1 report, Eversource does have concerns and questions regarding some of the proposed recommendations. The list below shows the Draft phase 1 Report recommendations in bold text, followed by Eversource's comments:

- **Adopt clearly defined protocols with respect to assigning an event type (retrofit, replace on failure, early retirement).**
 - Eversource recognizes the importance of the existence of clear criteria for assigning event types across programs to support an ER event type classification. However, Eversource believes that the report's recommended protocols for participation in ER programs and retrofit measures reclassified as ER are restrictive and inconsistent with other parts of our territory. Specifically, in Massachusetts, residential ER programs event types are assigned using an algorithm based on the expectations for future life of equipment for two more years.¹
 - Evaluators concur with more explicitly separating the residential and C&I criteria. We will modify the report to reflect this. Additionally, similar to MA, an alternative approach that may be appropriate for residential or C&I would be to empirically determine the mixture of ER and ROF in programs and base savings estimates on that mixture. This would be done at a program level instead of at a project level.
 - Eversource also seeks more clarity on what criteria will be used to determine which measures are affected by that adoption of dual baseline calculations. The recommendations as written seem to apply to all measures (C&I/residential, custom/prescriptive), but the proposed criteria seem best suited for C&I measures with site-specific data.

¹ https://ma-eeac.org/wp-content/uploads/MA19X03-B-RSRNTG_Residential-SR-NTG-Report_FINAL_2020.5.28.pdf, appendix C.1, Event Type Algorithm

- As noted above, evaluators will modify to make clear differences between residential and C&I criteria.
 - Eversource seeks clarification on how the proposed criteria could be applied to residential or high-volume measures where site specific data is not available. In section 4.1.3 the report acknowledges that, “In the case of a program that is targeting a high volume of smaller measures, such as residential programs or small commercial programs the high-volume replacement may make it cost-prohibitive to pursue site-specific information.” However, this is not addressed in the criteria discussed in section 4.1.2.
 - Evaluators will add clarity to the document
 - The report recommends using market studies to both identify opportunities and define the baseline for high-volume smaller measures. It would be helpful to define how the market study would need to be constructed to inform ER calculations. Note that equipment removed through ER may not be an average age. Depending on the design of the market study, it might identify opportunities to target ER savings, e.g., high saturation of inefficient, below code/ISP equipment, but not necessarily help in the savings calculations.
 - Evaluators will update with some criteria guidelines. Generally speaking, for a market study to be utilized in the manner suggested it would need to have sufficient detail of the market baseline in order to assign an age to the removed equipment. This would require a statistically designed sample size that is representative of the market population. The actual age of removed equipment will vary, but the intent would be to lean on the market study in lieu of trying to collect site by site information to be able to statistically state that the overall average age of the equipment is at a certain level, and then use that as the RUL for all savings calculations from the program.
- **Evaluators recommend adopting the following protocols with respect to assigning an event type: equipment is still functional, needs only minor repairs, has been operating in failed mode, or has failed but is replaceable with on-site or backup equipment of similar efficiency; AND equipment has less than 2/3 through its standard EUL or there is documented evidence to long term maintenance or inability to replace the equipment.²**
 - Eversource is concerned that the 2/3 EUL criterion will unduly limit participation in the ER RFP program. This effort is intended to remove older inefficient equipment that would nevertheless persist for a long time (e.g., boilers). The ER RFP program is new, and the first projects to be run through the program are just being installed now. For the time being, Eversource proposes to allow the ER RFP program to be implemented as designed, without imposing an age limit for this equipment. This approach is supported by a 2015 NEEP study which recommends, “Equipment age is not a basis to conclusively discriminate between ER and NR projects. In particular, PAs should not implement maximum equipment age requirements—older units are likely to be the most cost-effective to replace.”³ Once Phase 2 of this project is complete and the evaluators have assessed the extent to which the ER RFP program has been successful in incentivizing true ER projects, then they could develop recommendations on adjusting criteria for participation in the ER RFP program if needed.
 - The participating projects will certainly be reviewed as part of Phase II as well.
 - Evaluators also note that as written, the criteria do allow for projects that are beyond 2/3 of the useful life to participate. The recommended protocols include the following allowance: “Was beyond 2/3 of its EUL, with documented evidence

² For a complete description of the recommended criteria, see section 4.1.2 of the Review Draft Report.

³ <https://neep.org/sites/default/files/resources/FINAL%20NEEP%20Report.pdf> (Page 7)

of either commitment to long-term maintenance or a facility's inability to make the capital commitment necessary to replace it, even if major repairs are needed." This clause is specifically intended to capture older equipment that is functioning and could continue to function due to facility upkeep of the equipment.

- In addition to the clauses stated, and as newly noted above, we will add language that will allow for determination of the mix of ER and ROF empirically through ex-post research.
- **Use the values in the CT PSD where they are listed for remaining useful life (RUL), and elsewhere where dual baseline calculations should be adopted, use 1/3 of the EUL.**
 - The 2015 NEEP study notes that “studies of mechanical and electric equipment indicate that the likelihood that an individual [piece of equipment] survives to a particular age increases as the individual piece of equipment successfully ages.”⁴ Given this fact, NEEP recommends using a survival curve method to estimate site-specific equipment RULs based on the age of existing equipment removed, rather than assuming the RUL is equal to 1/3 of the EUL. Where possible, Eversource suggests that the program collect age of removed equipment, and then work with the evaluators to determine when survival curves can be used. This approach could be possible where site specific information is available on the age of equipment removed, and a survival curve, such as those computed by LBNL or DOE, exists. This approach would deem the average age of removed equipment and establish a fixed RUL that is used for all equipment in the program based on the analysis of recent participants. Where data cannot be gathered regarding the age of removed equipment, or where published survival curves are not available, Eversource accepts that the 1/3 of the EUL is the best available approximation of RUL.
 - If programs want to establish site specific RULs using the survival curve method, evaluators will accept this method provided that sufficient documentation can be provided as to the age and condition of the existing equipment. We will note this in the document and that 1/3 can be used where sufficient documentation is not available. Additionally, moving forward, evaluation studies that are in progress will have information regarding residential heat pumps, furnaces, and a few other measures. X2001 is the study that will be providing guidance on this.
- **Expanded use of dual baseline calculation approaches should be adopted when calculating lifetime gross savings for retrofit measures.**
 - Eversource would like greater clarification about what measures, beside those one currently defined in the PSD, should adopt dual baseline calculations, and what those baselines should be. The criteria for when dual baselines should be applied should be clearly stated in the draft report. Specifically, Eversource asks for clear directions on how this recommendation should be implemented for lighting measures.
 - Lighting specific information is being provided by study C2014.
 - Eversource would like the report to include an example to clarify the scenario when the lost opportunity baseline is equal in efficiency to the retirement savings baseline, and therefore a dual baseline approach is not warranted.
 - Evaluators will add an example of this
 - The draft report affirms that the adjusted measure life (AML) may be appropriate in some cases. Specifically, if an AML is determined with rigorous and defensible methods and the

⁴ <https://neep.org/sites/default/files/resources/FINAL%20NEEP%20Report.pdf> (Page 26)

value is determined to be appropriate through review by evaluators, then AMLs may be used in place of a true dual baseline. Eversource asks for clarification on what constitute “rigorous and defensible methods.” If those methods are properly applied, under what conditions should the PA’s continue using the AML method, as currently defined in the PSD, instead of a dual baseline methodology. The C2014 study recommends use of AMLs for C&I lighting; it would be helpful if the X1939 report could affirm that use of AMLs is an appropriate way to account for dual baselines for C&I lighting.

- Evaluators will update the report to include more detail on the definition of “rigorous and defensible”, but essentially it would mean determined through a quantitative analytic process, not determined through qualitative ER EULs that are currently in use in CT.
 - C2014 should be referenced for C&I lighting. We will update the report to note this accordingly.
- **Use of a calculation tool can help dual baseline adoption in the state. Adopt and convert the MA Custom Screening Tool for use in CT. This tool could be adopted to include prescriptive measures and calculations over time as well.**
 - Eversource seeks clarification related to the proposed adoption of BCR practices from MA (that are based in the Total Resource Cost test) into CT (where the current cost – benefit approach used is a Modified Utility Cost Test). Eversource would like to understand how the evaluators recommend accounting for deferred replacement cost calculations, which would be part of incremental costs, but which we believe would be excluded from the Utility Cost Test. NEEP recommends the Deferred Replacement Credit method which is used in Massachusetts in order to accurately estimate incremental costs,⁵ but it is not clear whether this method should be used in CT.
 - Evaluators are not recommending a change in the cost test. That being said, with even with the cost test remaining the same the denominator of the test used, the cost, will need to be calculated specially for dual baseline to ensure apples-apples with savings.
 - To elaborate, in a non-dual baseline savings calculation, if the project is classified as a retrofit, the cost used is the full cost of the project, if a project is a replace on failure, the cost is the incremental cost. This may be obvious, we are just providing for clarification. For dual baseline calculations there are two tiers of savings streams, full & incremental (usually). The cost test used should use costs in the same manner. The associated cost should be effectively 1/3 of the full cost + the present value of 2/3 of the incremental cost that would be incurred 3-5 years in the future. Special case: If the dual baseline second tier of lower savings isn’t driven by RUL of the measure (e.g. add-on where the underlying equipment load changes after a period of time) then only the regular immediate full cost applies.

Thank you for the opportunity to provide comments.

Sincerely,

David Roman-Ubeda

⁵ <https://neep.org/sites/default/files/resources/FINAL%20NEEP%20Report.pdf> (Page 66)

David Roman-Ubeda
Senior Analyst, Evaluation | Energy Efficiency | Eversource
david.roman-ubeda@Eversource.com