

CT EEB X1939 Early Retirement: Phase I Research

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Agenda

- Introductions
- Research Summary
- Program Overview, Objectives and Approach Overview
- Lifetime Savings Context
- Data and Calculation Findings and Recommendations
- Program Design Findings and Recommendations
- Questions

Best Practices Research and Recommendations Summary

- Best practices research resulted in 11 recommendations across three categories
 - Data and Lifetime Savings Calculations
 - Evaluation Considerations
 - Early Retirement Program Design
- Many of the recommendations covered in this study apply to programs beyond Early Retirement programs, any program where existing equipment may be used as the baseline
- Overall recommendation is to expand the use of dual baseline calculations in CT

Program, Objectives and Approach Overview

ER Program Overview

- Aspects of this first portion of this evaluation are applicable to **Early Retirement specific programs as well as any other program where a measure might use the existing equipment as the baseline** which could require dual baseline calculation methodologies
- ER programs target equipment that would have continued to operate until the end of its useful life without program intervention
- The first ER programs released are competitive bid programs and include:
 - 2 rounds of large chillers (600 tons and up)
 - Roof top units (RTU) - Program across CT and MA
 - Boilers

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2019-2020 Evaluation Objectives

Objective	Source	Applicable Programs
1. Provide feedback on ER program design, including which gross and net parameters are relevant for ER programs	Best Practices/ER Design Research	Early Retirement
2. Ensure that CT programs are accounting for dual baseline calculations where applicable as outlined in the CT PSD	Best Practices/ER Design Research	All programs with existing equipment baselines
3. Ensure that the program is equipped to handle non-energy impact factor considerations for ER projects	Best Practices/ER Design Research	All programs with existing equipment baselines
4. Optimize the process effectiveness and efficiency for ER programs	Best Practices/ER Design Research & CT ER Impact Eval	Early Retirement
5. Use program EM&V to assess the performance of ER programs and to better inform the design of ER programs	CT ER Impact Eval Research	Early Retirement

Evaluation Overview

Best Practices Research

- Lit review of ER programs across North America (NY, MA, CA)
- Interviews of Program Managers and CT Trade Allies
- Review of CT Program Data

Interim Deliverable – This presentation and memo documenting findings and recommendations

CT ER Impact Evaluation – *Three programs released to date*

- Review of a census of projects that have participated
- Confirm the appropriateness of the first-year and lifetime savings
- Review of program eligibility requirements and any benefit-cost ratio (BCR) screening

Final Deliverable – Full project report documenting updated impact factors (realization rates) and program improvement recommendations

7

Lifetime Savings Calculation Context

Best Practice Applies to Multiple Program Types

8



DUAL (TWO-PART) BASELINE LIFETIME SAVINGS CALCULATION

- Method is recommended in the PSD when existing equipment is used as the baseline and it differs from code or ISP
- CT PSD:** Commercial measures utilize a blended measure life and residential measures utilize a “two-part” savings calculation, or dual baseline savings calculation methodology

Industry Standard Practice (ISP) – Equipment or practice specific to the application or sector that is commonly installed absent program intervention

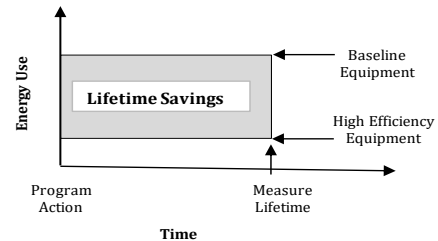
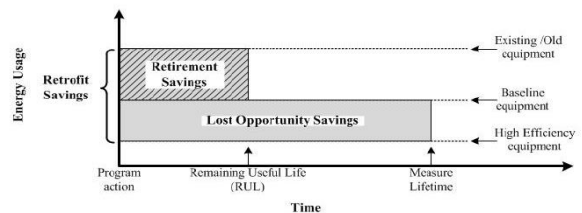


Chart 1-A: Retrofit, Retirement & Lost Opportunity Savings



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Dual Baseline Context

The following considerations are the decision points and variables that must be considered when applying dual baseline calculations:

- Project Classification/Program Eligibility
 - Preponderance of evidence
- Remaining useful life (RUL)
- Effective useful life (EUL)
- Lifetime savings calculation (dual baseline)
- Adjusted measure life (AML)*

*Some administrators have found it difficult to track and report the two-tiered savings streams (and correspondingly complex cost) associated with ER measures. In lieu of doing so they have adopted the concept of an AML, which is intended to reflect the equivalent lifetime savings as a dual baseline measure using a single constant stream of savings at the first-year retrofit savings rate, but with a shortened measure life. MA and CT use this principle.

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Data Collection and Lifetime Savings And Evaluation Consideration Findings and Recommendations

Applicable to any program that uses existing equipment as a baseline

Findings

Question	MA	NY	CA	CT
Dual Baseline: How can all applicable programs best use dual baseline methodologies for determining savings from offerings that incentivize equipment replacement	<ul style="list-style-type: none"> Required, acknowledges there may be instances where baseline does not change. Pre-made tool (custom measure tool) to perform calculations minimizing impact on implementer 	<ul style="list-style-type: none"> Required with exceptions for certain measures. Burden is on PAs Doesn't seem to be adopted state-wide Contains special circumstances clause 	<ul style="list-style-type: none"> Dual baselines must be utilized for program-induced accelerated replacement measures Senate Bill 6 	<ul style="list-style-type: none"> Required per the PSD for certain measures Not fully adopted among all retrofit programs
RULs: How are remaining useful lives determined for various pieces of equipment?	<ul style="list-style-type: none"> Implementers: Use CST – includes assumptions for OYF Evaluation: RUL is always one-third of the EUL 	<ul style="list-style-type: none"> Site by site – determined by implementer 	<ul style="list-style-type: none"> Use one-third of the effective useful life in DEER as the remaining useful 	<ul style="list-style-type: none"> Specified in PSD for dual baseline measures PSD also has blended measure lives for other retrofit measures
Data: What data is collected to support those assumptions?	<ul style="list-style-type: none"> MA recommends collecting data on RUL, but still to use 1/3 of EUL. It is not clear if this is being done. Reasonable POE requirements 	<ul style="list-style-type: none"> NY has site by site questionnaire to determine EUL 	<ul style="list-style-type: none"> RUL is always 1/3, EUL is prescribed for deemed measures and site by site for custom measures Extensive table and burdensome POE to allow for existing baseline use. 	<ul style="list-style-type: none"> Will be addressed in Phase II of this evaluation
Special Calculation Processes: Are there any special factors used to calculate lifetime savings for early retirement measures?	<ul style="list-style-type: none"> MA implementers use the "out-year factor" or OYF to adjust the EUL to reflect dual baseline effects in a single baseline-based custom screening tool. The OYF was developed through evaluation activities 	<ul style="list-style-type: none"> Exempts machinery and multifamily central heating system replacement from dual baseline consideration and designates them as retrofits 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> Blended measure lives
Impacts: What are the impacts on program savings and evaluation results after implementing these dual baseline calculations?	<ul style="list-style-type: none"> Lighting: 27% reduction Non lighting 3% reduction 	<ul style="list-style-type: none"> None explicitly called out in evaluation reports could be located 	<ul style="list-style-type: none"> None explicitly called out in evaluation reports could be located 	<ul style="list-style-type: none"> Will be addressed in Phase II of this evaluation
ER Guidance: Source of early retirement guidance in each state	<ul style="list-style-type: none"> Policy guidance documents for evaluators and implementers Custom screening tool for implementers 	<ul style="list-style-type: none"> TRM 	<ul style="list-style-type: none"> Legislative orders, policy document for POE 	<ul style="list-style-type: none"> PSD Evaluation findings and feedback (this report)

Determining Market Event

Evaluators recommend adopting the following protocols with respect to assigning an event type

- Use of ER should require a preponderance of evidence such as trend data, metered data, dated photos/videos of operation, bid quotations or similar demonstrating that the pre-existing equipment either:
 - Is fully functional
 - Needs only minor economically viable repairs (e.g. repair cost is < 20% of replacement cost) for continued operation
 - Has run in failed or partially failed mode for more than two years
 - Had failed but was replaceable with on-site in-stock inventory or back-up equipment similar in efficiency
- In addition, evidence should be presented that demonstrates that the replace equipment either:
 - Was less than 2/3 through its standard EUL
 - Was beyond 2/3 of its EUL, with documented evidence 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.

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Determining RUL

Recommendation: Use the values in the CT PSD where they are listed for RUL, and where they aren't, but dual baseline calculations should be adopted, use 1/3 of the EUL be used

- **For early retirement-specific programs:** *Recommendation: Site-specific RUL information should be collected for any program where equipment is being targeted for early replacement*
- **For residential or other higher volume programs:** If CT designs this type of ER program, primary research to develop pre-determined RULs should be considered. A market study on EULs should be conducted at the same time.

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Data and Lifetime Savings Calc Recommendations

Recommendation: Expand the use of dual baseline calculation approaches to determine lifetime gross savings for retrofit measures

- Dual baselines have been adopted for Early Retirement programs in CT
- CT PSD uses slightly reduced measure lives for “retrofit” measures
- If it can be established that the baseline would not have changed over time due to evolving codes or standard practice then may not be applicable

Recommendation: 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

- The tool has the following key factors built into it:
 - Benefit cost ratio (BCR) (this would need to be updated to the utility cost test, which is used in CT)
 - Single/dual baseline calculation selection
 - Measure lives
 - Out year factors
 - Remaining useful lives

NEIs and Evaluation Considerations and Recommendations

Recommendation: NEIs should be treated in the same manner as energy savings when determining the benefits of a measure and when calculating the cost benefit ratio

- Consideration must be given to any difference in the NEI between the retrofit component and a new code or ISP compliant piece of equipment

Recommendation: Clear, defensible documentation is the most important aspect in ensuring that savings are upheld through evaluation

- Data format - Clear documentation of lifetimes as well as event types
- Preponderance of evidence – Information to document outlined in report
- Market studies - Can prevent the need to collect site-by-site POE information. This market study should be kept readily available and provided to evaluation when the program gets evaluated so that the baseline is clearly defined for evaluators upon review.

Implications on CT Programs of Expanding Dual Baselines

- CT implementers have started adopting practices such as blended measure lives where they apply
- We expect the largest impact to the portfolio from expanding these practices to be from a reduction in savings for lighting projects that are outside of SBEA (MA saw a 27% decrease)
 - There is a study in progress that will update the relevant impact factors for C&I lighting (C2014)

Measure	Programs with Projects	# of Projects Identified	Total # of Projects Using Blended ML or RUL
Chillers	EO, ECBMR, ECBER, ECBNC	17	1
Boilers	EO, ECBMR, ECBER, ECBNC, EC, NE	71	0
SBEA Lighting	SBEA	21,062	21,062

ER Program Design Findings and Recommendations

Applicable to Early Retirement Programs

Program Design Consideration Findings Summary

Question	Program Administrators	CT Vendors
<p>What programmatic design considerations are most important when structuring this type of incentive program?</p>	<ul style="list-style-type: none"> ❑ Biggest barriers include upfront measure cost and customer ambivalence to investing in the replacement of functioning equipment. ❑ Collection of POE at a site level becomes expensive quickly and can make programs cost ineffective. 	<ul style="list-style-type: none"> ❑ Biggest barriers include upfront measure cost and customer ambivalence to investing in the replacement of functioning equipment. ❑ Securing customer commitment to retire large capital equipment early requires time. Program timelines must be designed with this in mind, so that vendors have the time they need to sell the measures.
<p>What approaches are used for identifying target customers for participation?</p>	<ul style="list-style-type: none"> ❑ Utilization of market studies to demonstrate potential for specific kinds of territory-wide ER measures – creates efficiencies of scale when it comes to collecting POE ❑ Relationship developing programs such as study programs provide information sharing between customers and Pas and can help identify equipment to target for replacement 	<ul style="list-style-type: none"> ❑ Customers who would suffer greatly from the loss of functioning equipment could be good to target (e.g. schools, hospitals) ❑ Vendors must be conditioned to educate all customers that funding is available for equipment that is “nearing end of life,” and not just failed equipment.

ER Program Recommendations Large Commercial/Industrial

Recommendation: *Extend competitive bid RFP solicitation timelines.*

- Timing is critical for the customer decision process.

Recommendation: *Plan programs further in advance and hold vendor trainings well in advance of program release.*

- The vendors are the ones with the customer relationships.
- Having an ongoing relationship with them is critical.

Recommendation: *Use energy studies to bolster customer relationships and to identify target equipment for replacement.*

- Energy studies provide the opportunity to engage with customers and identify equipment that could be targeted for early replacement

ER Program Recommendations Residential and Small Commercial

- **Recommendation:** *For residential and small commercial measures, use market characterization studies to identify opportunities and target replacement in bulk.*
 - Collecting preponderance of evidence at a site-level has been cost prohibitive
 - The average age of equipment can be determined by a market study and that equipment could potentially be replaced in bulk

Next Step - Conduct Evaluation of CT ER Programs

Phase II

Impact Eval of CT ER Program(s)

- Current programs in scope:

Program	Number of Awarded Projects
2019 Chiller Program	4
2020 Chiller Program	1
2020 Boiler Program	1
2020 RTU Program	11
Total	20

- Build on the information gathered in ER research to determine the best approach to collecting data and performing impact evaluation activities
 1. **Develop sampling strategy** – Given participation numbers currently will likely attempt a census.
 2. **Desk reviews** – Collect program information, review and confirm calculations, and review project materials addressing the appropriate baseline treatments.
 3. **Customer interviews** - For each desk review performed, ERS will also reach out to the customer to discuss key project information (existing equipment parameters).



Questions?
Thank You

Best Practices Research

Evaluation Considerations

Data and Savings Calculations

All programs with existing equipment baselines

- > How can programs best use dual baseline methodologies for determining savings from offerings that incentivize early retirement?
- > How are remaining useful lives determined for various pieces of equipment? What data is collected to support those assumptions?
- > Are there any unique factors utilized to calculate lifetime savings for early retirement projects, such as an out-year factor?
- > What are the impacts on program savings and evaluation results after implementing these dual baseline calculations?

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Program Design

ER Programs

- > What programmatic design considerations are most important when structuring this type of incentive program?
- > What approaches are used for identifying target customers for participation?