LBR Working Group, April 11 2018
NH Utilities Position on Degradation Factors and Confidence and Precision

Degradation Factors

The NH utilities assume a degradation factor of 100% as a conservative estimate for the impact of performance degradation over the life of energy efficiency measures, which often exhibit lower rates of performance degradation than the baseline equipment against which savings are determined. Per established evaluation protocols—including the California Energy Efficiency Evaluation Protocols, [i] DOE Energy Efficiency Program Impact Evaluation Guide,[ii] and Lawrence Berkeley National Laboratory Energy Savings Lifetimes and Persistence studies[iii]—energy efficiency in both standard and high efficiency equipment often decreases over time. The energy savings over time is the difference between these two curves.

Savings degradation can be costly to study, as they may require long periods of time to measure changes in performance of both high and standard efficiency equipment over their useful lives. Where it has been studied, degradation has been found to have an insignificant impact on savings in most cases, and in other cases it has been found to result in increased savings estimates due to the greater degradation of baseline equipment relative to efficient equipment. For example, California does not require degradation studies, as it has found that the incremental level of this type of degradation measured in five persistence studies from 1995 to 2000 was insignificant for over 95% of measures, and for several measures baseline equipment performance degraded significantly more than efficient equipment. The findings would result in degradation factors for several measures greater than 100%, reflecting growth in savings relative to baseline equipment over the life of the measures.

In addition, New Hampshire evaluations typically result in savings realization rates, which reflect changes in equipment performance and other factors that would affect savings over a measure's life, such as changes in operation or other behavioral changes. Realization rates are currently applied to the NH Utilities' reported savings for both kWh and kW.

Finally, home energy reports are a unique measure in that savings are behavior-based, and calculated relative to a control group of nonparticipants. In this case, persistence (i.e., degradation) of savings for participants has been rigorously studied and savings have been found to persist at some level for several years after participants receive reports.[iv] For this program, the utilities already account for savings degradation through compounding reductions to savings in each of the 4 years of the measure life for home energy reports.

Confidence and Precision

The NH utilities do not believe there is a basis for reducing lost base revenues due to EM&V confidence levels being less than 100%, as statistical estimates from EM&V studies are equally as likely to understate true savings as they are to overstate true savings, and such a reduction would reflect an incorrect interpretation of statistical confidence and precision.

As explained in DOE's *Energy Efficiency Program Impact Evaluation Guide*[v] and other statistical literature, precision intervals are the interval or range in which the true value of a particular parameter (e.g., mean, median) for the full population being sampled is likely to fall, and the confidence level is the probability that the true value actually falls within that interval. For example, if the average savings for a

sample of projects is 500 kWh with 10% precision at the 95% confidence level, that means that the true average savings for the full population of such projects has a 95% probability of being between 450 kWh and 550 kWh—with the most likely value being 500 kWh. Confidence and precision reflect the certainty of sample estimates, and they are directly tied to sample sizes—with larger sample sizes resulting in smaller precision intervals and/or higher confidence levels. Larger samples sizes require more evaluation resources, and therefore it can be costly to achieve higher confidence and narrower precision. Therefore, penalizing utilities by reducing LBR based on EM&V confidence levels creates a perverse incentive to increase spending on EM&V beyond what is needed to achieve the levels of confidence and precision (e.g., 90/10) that are widely used in energy efficiency programs across the country.

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[i] CPUC, *California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals*, April 2006. See p.105, "Effective Useful Life Evaluation Protocol (Retention and Degradation)."
https://www.puc.nh.gov/EESE%20Board/EERS_WG/ca_energy_efficiency_evaluation_protocols.pdf.

[ii] DOE Evaluation, Measurement, and Verification Working Group, *Energy Efficiency Program Impact Evaluation Guide,* December 2012. See Section 7.3.1, Definitions and Section 7.3.3, Determining Persistence.
https://www4.eere.energy.gov/seeaction/sites/default/files/pdfs/emv_ee_program_impact_guide_1.pdf

[iii] Lawrence Berkeley National Laboratory, *Energy Savings Lifetimes and Persistence: Practices, Issues and Data*, May 2015
https://www.puc.nh.gov/EESE%20Board/EERS_WG/3_15_2018_lbl_savings_lifetime_persistence_brief_may2015.pdf

[iv] See for example,

- Hunt Alcott and Todd Rogers, *The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation*, https://www.aeaweb.org/articles?id=10.1257/aer.104.10.3003
- NMR, *Eversource Behavior Program Persistence Evaluation*, Oct 15, 2017, https://www.energizect.com/sites/default/files/R1606_Eversource%20Behavior%20Persistence%20Evaluation_FINAL_10.15.17.pdf;
- NMR, *Evaluation of Persistence in the Eversource Customer Behavior Program*, March 2016 https://www.energizect.com/sites/default/files/R32%20-%20Persistence%20of%20Eversource%20HER%20Pgm_Final%20Report,%203.30.16.pdf;

[v] DOE Evaluation, Measurement, and Verification Working Group, *Energy Efficiency Program Impact Evaluation Guide,* December 2012. See Section 7.4.2, Random Errors.
https://www4.eere.energy.gov/seeaction/sites/default/files/pdfs/emv_ee_program_impact_guide_1.pdf