Memorandum

To: Stakeholder Advisory Group

**FROM:** KALEE WHITEHOUSE, PROJECT MANAGER and SAM DENT, TECHNICAL LEAD on Behalf of VEIC TRM Team

subject: Proposed Evaluation Priorities for the TRM

date: OCTOBER 17, 2022

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In an effort to increase the accuracy of the IL Statewide TRM, VEIC offers the following list of measures and details of specific parameters for which we believe investment in evaluation may be most beneficial to the accuracy of the TRM saving estimates.

We have also provided a qualitative measure of our sense of priority and an explanation of this assessment, such that those parameters that currently have the least confidence or highest impact rise to the top. This qualitative prioritization is based upon a number of metrics:

* Importance of the measure(s) currently and anticipated importance in the future
* Impact of particular assumption(s) within the measure – i.e., some assumptions within an algorithm can have a significantly greater impact to the final savings value than others
* Source of existing assumption
* Confidence in existing assumption

These priorities reflect VEIC’s high-level assessment only. This list is not meant to be exclusive or imply that other evaluation priorities should not be executed based on overall evaluation and program objectives.

Redline edits indicate new recommendations as well as changes from previous recommendations due to subsequent evaluation activities.

**Provisional Measures**

The following measures have been given the new designation of “Provisional Measure”. As per Section 3.4 of Volume 1, these measures are *“generally nascent in Illinois or nationally, for which energy savings have not been validated through robust evaluation, measurement and verification (EM&V) efforts, and/or for which there is substantial uncertainty about their cost-effectiveness, performance, and/or customer acceptance*.” These measures have been assigned a one-year Review Deadline, meaning that the measure will undergo a review for reasonableness, continued program relevancy, and update of material assumptions during the next TRM update cycle. Expectations are that the Program Administrator will work with evaluators and the TRM Administrator to design and undertake pilot studies, evaluations, or other relevant activities on an appropriate number of installations of the Provisional Measure within that year, with the goal of informing the development of more-robust and Illinois-specific savings assumptions.

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| **Measure #: Measure Name** | **Parameter Recommended for Evaluation** | **Reason for Concern in Parameter** | **Priority Level** | **Reason for Priority Assignment** | **Year added** |
| 4.2.21 On-Demand Package Sealers – Provisional Measure | Energy Savings Factor | Current assumption is not based on evaluation or metered data.  | High | Provisional measure as key savings factor needs updating to be based on real world application data.Limited participation to date.  | 2021 |
| 4.4.47 Air Deflectors for Unit Ventilators – Provisional Measure | Savings verification | Measure requires continued evaluation of savings from installations to sure up any deemed assumptions. | High | Provisional Measure currently based on a small number of projects.\* Covid delays but evaluation results expected for v12 \* | 2019 |
| 4.4.60 Variable Refrigerant Flow HVAC System – Provisional Measure | Savings verification | First version of measure based on energy modeling.  | High | Field Testing of VRF systems is being performed in phase 2 and will be used to update savings. | 2022 |
| 4.7.6 Vortex Tube Thermostat – Provisional Measure | Savings verification | Review of savings factor appropriateness with real world applications | High | Provisional measure without real application grounding.Limited participation to date. | 2019 |
| 4.8.20 Energy Efficient Hydraulic Oils – Provisional Measure | Savings verification | Evaluation of real-world savings across multiple sites and customer types. Current measures rely heavily on industry sponsored or anecdotal assumptions. | High | Provisional measure without real application grounding.\* Ongoing evaluation – results due next year \* | 2020 |
| 4.8.21 Energy Efficient Gear Lubricants – Provisional Measure | Savings verification | High | 2020 |
| 5.3.19 Thermostatic Radiator Valves – Provisional Measure | Savings verification and %TRVSavings | Estimates of savings for IL and for a variety of applications.  | High | Provisional measure. Low cost measure with potential high savings.Limited participation to date. | 2020 |

**High Priority Recommendations**

The following list provides VEIC’s assessment of the other highest priority parameters for evaluation.

| **Measure #: Measure Name** | **Parameter Recommended for Evaluation** | **Reason for Concern in Parameter** | **Priority Level** | **Reason for Priority Assignment** | **Year added** |
| --- | --- | --- | --- | --- | --- |
| General | Data on Income Qualified populations | There currently is limited distinction made in the TRM for Income Qualified populations. Existing examples include kit measure ISRs, LED lamp baselines, Room AC and % electric v gas heating. In order to best serve this sector, we would like to see data routinely collected across all applicable studies that would allow distinctions to be made between income qualified v non-income qualified populations, to allow the TRM to appropriately account for differences where they appear. | High | Serving Income Qualified populations is a priority and understanding where differences between populations are appropriate is challenging without good evaluation data. | 2021 |
| 4.1.11 | Commercial LED Grow Lights | Evaluation of cannabis and other controlled environment agriculture projects to determine interactive effects between horticultural lighting and the HVAC and dehumidification systems to better inform the prescriptive waste heat factor assumptions.  | High | High impact measure with growing market | 2022 |
| 4.4.48 Small Commercial Thermostats | Electric Furnace v Heat Pump  | HSPF default was removed in 2022 as unknown frequency of various electric systems | High | Will allow upstream application of the measure | 2022 |
| 4.5.4 LED Bulbs and Fixtures | Incremental costs | Rapidly changing market and costs are multiple years old now | High | High savings measure and key assumption for cost effectiveness.Data expected for v12 | 2017 |
| 4.8.12 Spring-Loaded Garage Door Hinge | Savings Verification | A limited number of pilot projects currently form the basis of the savings. Lack of third party verification to validate deemed savings. | High | Potentially high savings measure without real application grounding. | 2019 |
| 4.8.16 Commercial Weather Stripping4.8.27 C&I Air Sealing | Rx savings per weatherstrip | Currently based upon lab testing. After discussions in TAC assumptions were made more conservative and in line with residential assumptions, but any real world application and evaluation studies would benefit the measure’s robustness. | High | New very low cost measure that could easily become high volume measure. | 2019 |
| Multiple appliance measures | IQ baselines and measure lives | The IQ Working Group have called out appliances as an area of focus – specifically appropriate baselines (second hand market v new) and expected lifetime of measures and/or remaining useful life of existing units. | High | An evaluation or alternative approach (collecting contractor or CBO/CAA experience) could inform key IQ specific assumptions to the appliance measures  | 2022 |
| Multiple Kit measures | ISR adjustment for “Plan to Install” | Discussions during v10 update around if and how participants who indicate a plan to install should be incorporated into the Install Rate. Evaluation that assessed proportion of respondents that subsequently follow through would help support future update. | High | High volume/impact measures | 2021 |
| Multiple HVAC measures | EFLHs and HDD/CDD assumptions | EFLHs and HDD/CDD assumptions are based upon climate normal data that is increasingly out of date. Any evaluation effort that can help inform new assumptions would be helpful. | High | Impacts many measures. Climate is changing and should be regularly reflected in the TRM. | 2020 |
| New HVAC ratings | New federal standards and efficiency ratings become effective 1/1/2023. The current TRM defers this as baseline until 1/1/2024 due to supply constraints, product sell through etc.  | High | Market survey of HVAC system equipment sales would help inform how market is shifting to new standards. | 2022 |
| Multiple Heat Pump measures | Interaction of home size, system capacities and auxiliary sources | For homes installing central or ductless heat pumps, we would like to have data to inform:* Home square footage, both entire home and for conditioned space served by the heat pumps,
* System capacity, for heat pump as well as auxiliary/ backup heating/cooling sources, summed across all units for houses relying on multiple units
 | High | High impact measure. Questions arose during 2022 that we did not have good data to support the development of sound assumptions | 2022 |
| In-situ heat pump performance and customer use strategies | To help inform:* EFLH estimates
* Displacement and part-use strategies
* Equipment performance and efficiency adjustments
 | High | 2022 |
| Equipment and ‘electrification costs’ | With increasing fuel switch measures- understanding associated costs is a critical component | High | Key component to ensure electrification measures are cost effective | 2022 |
| Unknown default replacement system types and efficiencies | While data exists relating to the type of system being replaced by heat pumps, there is no data evaluating whether the program (particularly mid-stream) influenced the actual decision to change system *type* (e.g. to fuel switch) or simply influenced the participant to purchase a more efficient unit of the same type.  | High | High impact measure and may become more a popular program design. | 2021 |
| 5.3.16 Advanced Thermostats | Lifetime / Persistence | Characterization currently depends upon a number of studies that only lasted a single year or less.  | High | High impact measure and key assumptions for cost effectiveness and CPAS | 2017 |
| 5.6.1 Air Sealing | Prescriptive Heating and Cooling Assumptions | Prescriptive heating assumptions are based on Connecticut and Virginia based study. Cooling savings based on ASHRAE Fundamentals. An Illinois based evaluation to estimate savings from these low cost Rx measures would be beneficial | High | Prescriptive approach is growing in portfolios and would benefit an Illinois evaluation. | 2021 |
| All Shell measures | Income Qualified existing shell R-values, insulation condition and HVAC efficiencies | To support distinction of defaults for income qualified populations based on the existing shell and HVAC characterizations in the home.  | High | Provide data for income qualified participants. Evaluation data from Opinion Dynamics pending? | 2021 |

**Additional Recommendations**

Additional suggestions for evaluation are provided below:

| **Measure #: Measure Name** | **Parameter Recommended for Evaluation** | **Reason for Concern in Parameter** | **Priority Level** | **Reason for Priority Assignment** | **Year added** |
| --- | --- | --- | --- | --- | --- |
| 4.2.16: Kitchen Demand Ventilation Controls | Deemed electric savings and CFM/HP | Savings are based upon CA workpaper. | Medium | Low confidence in assumption. May be opportunities to make more of a custom calculation. | 2017 |
| 4.2.20 Efficient Dipper Wells | Baseline Annual Water Usage | Further evaluation will allow for appropriate deemed assumptions for a variety of commercial customers. | Low | Likely low impact measure | 2019 |
| 4.3.1: Water Heater | Measure cost | Measure cost assumptions are out of date | Medium | Costs do not have a recent or good reference. | 2017 |
| 4.3.6: Ozone laundry | Savings verification | Relatively new measure with assumptions based upon a small number of projects. | Medium | Evaluate whether metered savings consistent with assumptions. | 2014 |
| 4.3.11 Tunnel Washers | HotWaterReductionGallon  | During the 2019 TRM development session it was decided that a custom input is needed, as minimum evidence available for average hot water reduction with tunnel washers. | Low | Currently a custom input. Unlikely to become a significant measure for some time.  | 2019 |
| 4.4.5 Condensing Unit Heater | Capacity | Savings approach was updated in 2021 from a single deemed value to an algorithmic approach that now factors in equipment capacity. Additional evaluation recommendation to determine average installed capacities in the market for added savings claim accuracy. | Low | Likely low impact measure | 2021 |
| 4.4.52 Hydronic Heating Radiator Replacement | Savings Verification | In principal, the savings characterization use sound engineering judgement. But looking at a building/system comprehensively could result in different savings as there may be interactive factors not being considered. An evaluation can also call into question the effectiveness of the testing requirements on identifying improperly functioning radiators. | Medium | Potentially high savings measure that could benefit from real-world application grounding. | 2020 |
| 4.4.46 Server Room Temperature Setback | Savings factor and integration of server room temperature with fan power consumption. | Relatively old basis for savings factor would benefit from evaluation. | Medium | Measure was limited to maximum temperature adjustment of 95F but questions remain about potential savings and interactive effects. | 2019 |
| 4.4.55 Commercial Gas Heat Pump | Savings Verification | Early field studies suggest high variability in real-world performance depending on application and operating conditions. | Medium | Not likely to be a high volume/impact measure in the near future. | 2021 |
| 4.4.59 Ductless Heat Pumps | Partial Displacement and other adjustments | New measure based predominately on residential adjustments would benefit from Commercial evaluation | Medium | As measure grows would be good to assess typical C&I applications | 2022 |
| Commercial Lighting Fixtures | Reference tables with wattage and cost assumptions | Tables were based upon VEIC determined values for Efficiency Vermont. Evaluation of assumptions and appropriateness for Illinois could be performed.  | Medium | While it would be a worthwhile exercise, review and evaluation may be lengthy to perform. Note, VEIC are planning to update efficient wattage defaults based on updated DLC specifications for v12. | 2017 |
| 4.6.10: High Speed Rollup Doors | Savings verification | High volume/savings measure based on algorithm. Would be good to compare the resulting savings with metered savings. | Medium | Potentially high savings measure without real application grounding. | 2017 |
| 4.8.5 High Speed Clothes Washer | Market/baseline study on existing equipmentSavings verification and mid-life savings adjustments | Measure details savings for gas dryers only. Electric dryers and accompanied savings characteristics can be included if electric dryers have enough of a saturation in the commercial marketplace.Evaluate if an electric penalty should be applied for high speed clothes washers and if there are negative O&M implications for the measure. | Low | Potentially under-estimating market potential.Potentially overestimating annual and lifetime savings. | 2020 |
| 4.8.15 Smart Irrigation Controls | Savings verification and supplement characterization assumptions with actual project data | Discussed in TAC to supplement engineering approach in workpaper with actual project data. To date, during the v10 development cycle, no projects installations occurred | Low | Likely low impact measure | 2021 |
| 4.8.19 Energy Efficient Rectifier | Savings verification: Load, waste heat impacts | New measure without the ENERGY STAR framework of Uninterruptible Power Supplies. | Medium | New measure with limited real world evaluation | 2020 |
| 5.1.7 ENERGY STAR Room Air Conditioner | FLHRoomAC | Current assumption is based upon applying the Central AC to Room AC ratio from RLW North Easter study. This multiplier assumption could benefit from IL study | Medium | While we don’t have great confidence in the assumption, the savings per unit is low. If significant volume it could be a worth exercise to improve the assumption.  | 2017 |
| 5.1.9 Room Air Conditioner Recycling | Capacity and EERexist | Based on assumptions of prior Federal Standard. Could easily be recorded and updated to reflect actual units being collected. | Medium | Expect to be lower participation than Refrigerator Recycling | 2019 |
| 5.1.13 Income Qualified: ENERGY STAR Room AC | EFLH and baseline assumption for IQ participants.  | Income qualified assumptions were made for this new measure that could use corroboration.  | Medium | New measure with potential high impact. | 2020 |
| 5.2.1: Advanced Power Strip Tier 1 | Savings assumptions | Would benefit an updated and more local savings assumption. | Medium | Continues to have significant volume – savings increasingly old | 2017 |
| 5.1.15: Residential Bolt-On Smart Dryer Sensor | Electric savings | Basis of savings was a gas dryer study. Since run times can be quite different between electric and gas units, a similar evaluation of electric units would be beneficial | Medium | Low cost measure – current characterization could be underclaiming electric savings. | 2022 |
| 5.2.2: Advanced Power Strip Tier 2 | AV consumption. ISR / Persistence studies. Additional product evaluation. | v9 moved to technology based rather than product based rating as additional product evaluation had not been forthcoming.  | Medium | Any additional input to support technology based assumptions would be beneficial. | 2017 |
| Multiple HVAC measures | Quality Installation impacts | An independent evaluation of savings is highly recommended to support field measurements. | On hold | VEIC found a lack of independent evaluations of QI programs. Understand this isn’t currently in programs | 2017 |
| 5.3.8: Ground Source Heat Pump | Savings verification | Algorithms are very complex. An exercise to compare TRM estimates to actual would help strengthen the measure. | Medium | Potentially growing savings measure without real application grounding. | 2017 |
| 5.3.20 Residential Energy Recovery Ventilator | Savings verification and program data | This new v10 measure would benefit from program data to inform default assumptions and comparison of TRM estimates with actual savings.  | Medium | Potentially growing savings measure without real application grounding. | 2021 |
| 5.3.21 Air Handler Filter Cleaning / Replacement | ISR for kit approach | Currently measure is a DI type approach. In order to be able to add a market opportunity or kit assumption we would want to have a ISR estimate | Medium | If kit approach desired, key assumption which we do not currently have a basis | 2022 |
| 5.4.4 Low Flow Faucet Aerators and 5.4.5 Low Flow Showerheads | GPM of existing units being retrofitted | Discussion during v10 development for these assumptions. Current default assumptions are based on mix of high and low flow units, and NTG is therefore assumed to be 1. A study that measured only units being replaced would be more appropriate.  | Medium | High impact measure but unlikely to result in significant change to net savings. | 2021 |
| 5.4.5 Low Flow Showerhead | Community Distributed Kit ISR | This common delivery mechanism does not have an ISR assumption for showerheads while it does for other water measures. | Medium | High impact measure however may be able to develop assumption based on other measure ratios. | 2021 |
| 5.4.6 Water Heater Temperature Setback | Pre and post temperature.ISR for kit programs | Suggestion during v6 development that actual setback may be less than defaulted.  | Medium | Low savings measure but if evaluation already exists this would be a good update. | 2017 |
| 5.5.11 LED Night Light | Community Distributed Kit ISR | This common delivery mechanism does not have an ISR assumption for night lights while it does for other kit measures. | Medium | High impact measure however may be able to develop assumption based on other measure ratios. | 2021 |
| 6.1.1: Adjustments to Behavior Savings to Account for Persistence | Persistence levels, duration, and shape of multiyear persistence curve; Peak-specific persistence | More accurate information on IL-specific persistence levels, duration, and decay function will provide better cost-effectiveness calculations. Little information is currently available for peak persistence.  | On hold until 2024? | Assumptions of persistence levels, duration, and decay function affect cost-effectiveness and are likely to be significant. Peak persistence should be better understood. | 2016 |
| 6.1.1: Adjustments to Behavior Savings to Account for Persistence | Proportion of behavior program savings from efficient measures installed on the premises vs. behavior modification | If a non-trivial proportion of program savings comes from efficient measures installed on the premises and not otherwise identified through other direct program participation, this component of saving could likely persist even under new building ownership.  | On hold until 2024? | No national information available, so impact is unclear; assessing this impact would likely be a costly undertaking. Adjustments to savings persistence to account for move outs would be affected and, depending on outcome, could be non-trivial.  | 2018 |
| 6.1.1: Adjustments to Behavior Savings to Account for Persistence | Cost of behavior change; Move-out rates – to be applied to cost-effectiveness calculations | Little information available for cost of behavioral actions; Move-out rates needed to provide further accuracy for Cost-Effectiveness. | On hold until 2024? | Unclear that these will affect savings materially | 2016 |
| Loadshapes |  | Developed during first round of development. Would be worthwhile to continue to review focusing on the most used loadshapes. | Medium | Loadshapes generally have a smaller impact on cost effectiveness than coincidence factors applied to demand savings. Some key loadshapes improved in v7-9 TRM. | 2017 |