**MEMORANDUM**

**TO:** **IL TRM TECHNICAL ADVISORY COMMITTEE**

**FROM:** CHERYL JENKINS, PROJECT MANAGER; SAM DENT, TECHNICAL LEAD; NICK LANGE, ADVANCED THERMOSTAT LEAD - VEIC

**SUBJECT:** IL TRM VERSION 7.0 NON-CONSENSUS MEMO – ADVANCED THERMOSTAT FINAL

**DATE:** **09/13/2018**

**Cc:** CELIA JOHNSON, SAG

This memo documents positions and comments provided for the following issue for which consensus was not reached during the Version 7.0 update cycle:

> Advanced Thermostat 'Percent Cooling_Reduction' assumption – i.e., the assumed average percentage reduction in total household cooling energy consumption due to installation of an advanced thermostat

The issue is introduced below, followed by a Comparison Exhibit summarizing the key differences in opinion within the TAC, and finally an Appendix containing key commentary and documentation provided throughout the process.

# Issue Summary

For the last two years, VEIC in its role as TRM Administrator has been convening a very active subcommittee working group for stakeholder discussion around and contribution to Navigant's savings evaluation and its application to the advanced thermostat measure characterization. Participants to the working group included national leaders and experts from ENERGY STAR, product manufacturers and service providers, evaluation measurement and verification organizations, public interest groups, and utility and regulatory staff. Though broadly covering the entirety of the measure's characterization in the Illinois TRM, the focus of the subcommittee was the question of electrical savings related to cooling usage reductions.

The subcommittee participants contributed to the development of Navigant's study. This included many suggestions for analyses, and comments on methodological approaches that would more closely match the rebate programs than the demand response programs that formed the basis of Navigant's 2015/2016 evaluation. Multiple "touchpoint" meetings were facilitated by Navigant as they proceeded through phases such as: analysis and data collection plans; data validation and processing steps; and regression model outputs. In mid-April, 2018, Navigant shared draft results of -2% cooling savings (an increase in usage) in the subcommittee meeting. The accompanying slide deck covered aspects of program participant information, model terms and results, and interpretation of results. As a result of the working group's discussion and comments, in late May Navigant shared an addendum to the April draft results that included revised findings related to customer group segmentation, such as controlling for behavioral program treatment (HERs), and a different statistical regression model. These changes resulted in new cooling savings outputs of 1.7% with the original model, and 3.2% with the revised model.

Throughout the working group discussions of Navigant's analytical findings, there were many questions and concerns raised (all written documents are available through the IL TRM SharePoint site). These items relate to nearly every aspect of the evaluation: from the mathematical difficulty of measuring small changes in monthly billing data, to methods of constructing a matched comparison group, whether hourly billing or device data would be included in the work, and ultimately about the model that was used and how it can be validated and trusted, and what the meaning and application of the model outputs represent. Also raised as a concern was whether it is appropriate to incorporate evaluation results at a time when Navigant has not issued a final written report and narrative of the evaluation methods, findings, and interpretation. In the context and discussion of these concerns,

it became clear that the subcommittee may not reach a consensus value in time to support the TRM v7 measure revision.

To provide a path for improvement upon the TRM v6 cooling reduction value, in late June VEIC drafted and shared a memo describing an approach to developing a 'fallback' value which would be used in the case that consensus agreement could not be reached by the subcommittee membership without a financial stake in the value (manufacturers and vendors were excluded from these discussions). The memo, "Assessing the Illinois TRM Cooling Reduction Value for Advanced Thermostats" provided a framework for mitigating the empirical uncertainty evident in the volatility of the evaluation results, as well as the many questions and concerns raised. The memo can be read in full in the appendix but can be summarily described as a systematic way to group, average, and weight different findings with greater transparency and rigor than past professional judgment averages.

There appeared to be general acceptance of the structure of the approach (50% weighting to prior TRM value, 40% for Illinois-specific findings, and 10% for non-Illinois findings), but some disagreement was voiced around which findings to include or exclude in each category. For example, there was disagreement over what standard should be applied to analytical findings that were not part of a utility program evaluation. This question arises for how to handle ENERGY STAR's national estimate of savings, as well as Illinois-specific calculations of ENERGY STAR's cooling runtime reduction metric that can be calculated from these devices by manufacturers using ENEGRY STAR's software, to estimate % savings relative to an artificial flat schedule. The challenge in each of these cases is how to address the appropriate concerns of how to relate these non-evaluation values—these numbers lack the direct connection to energy impacts, and must be adjusted to account for estimated baselines and other factors—with the evaluation-grade findings and results.

In July, responding to subcommittee comments and discussion, VEIC issued an update to the memo reflecting agreement on revising values used for a subset of evaluations within the IL-specific and non-IL categories (specifically relating to averaging the two latter Navigant 2017/2018 evaluation findings (1.7% and 3.2% as mentioned above) and improved adjustments to the Indiana evaluation values conducted by Cadmus that were required to apply those findings to the IL TRM Cooling_Reduction value. As a result of these changes, the final proposed value went up from 6% to 6.3%.

VEIC received objections to this final proposed value from non-financially vested parties – the Environmental Law and Policy Center and Ameren – and financially vested parties – Ecobee and Nest. These positions are documented in the Comparison Exhibit below.

# Comparison Exhibit

| Illinois Statewide TRM Version 7.0: Comparison Exhibit of Non-consensus Technical Items | | | | |
|---|---|---|---|---|
| **Item Description** | **Position Statement** | | **Rationale** | **Supporting Stakeholders** |
| **What should be the cooling reduction assumption in TRM v7?** | Position One | In TRM v7, the cooling reduction value should be updated with appropriate application of the best available information: a weighted composite of prior consensus values and new evaluation-grade results. | **VEIC**: In the absence of consensus agreement on application and interpretation of IL-specific evaluation results to the TRM, the prevailing uncertainty can best be mitigated by broad and thoughtful incorporation of the diverse results that are available. This balances the volatility and lessen the impact of any singular or systemic bias in a particular direction. VEIC supports the incorporation of ENERGY STAR's runtime reduction into these savings value if these results can be shown to be appropriately adjusted and validated against a number of critical energy impact factors. These include many elements such as baseline setback behaviors, HVAC system characteristics and net to gross effects that are typically part of more conventional evaluations. Given that this analysis was not conducted, nor vetted in time for v7, the revision from v6 (going from 8% to 6.3%) is a modest change that appropriately incorporates the most recent findings of the Navigant evaluation, while balancing its impact given the concerns raised in the subcommittee process.<br><br>**Office of the Attorney General**: The Illinois Attorney General's Office supports the TRM administrator's newly established draft value of 6.3% for cooling savings for smart thermostats, which represents a very conservative and generous compromise based on the results of recent evaluations, as developed after several rounds of comments, and analysis of Illinois-specific evaluations. Objections that, in effect, artificially inflate the savings generated by smart thermostats do not further the purposes of Section 8-103B of the Act and put ratepayers at risk for the financing of measures that do not live up to their assumed energy savings value. This is particularly problematic given the new statute's allowance for electric utilities to earn additional profits for achievement of energy savings above the Illinois Commerce Commission-approved annual electric utility savings targets.<br><br>**Navigant**: Navigant supports the IL TRM Administrator's proposed cooling reduction value of 6.3%. Navigant agrees with comments from Karen Lusson. Additionally, primary independent evaluation research indicated a change to the TRM for electric cooling savings was warranted. There is not yet any independent evaluation results for IL supporting the old cooling reduction value of 8%. Given those findings and the potential for higher savings for non-early adopters, a modest update to the TRM and continued research on more recent participants seem appropriate. | VEIC, Office of the Attorney General, Navigant |

| Illinois Statewide TRM Version 7.0: Comparison Exhibit of Non-consensus Technical Items | | | | |
|---|---|---|---|---|
| **Item Description** | **Position Statement** | | **Rationale** | **Supporting Stakeholders** |
| | Position Two | The current TRM v6 value of 8% cooling reduction value should not be changed until ENERGY STAR cooling runtime reduction result of 14.8% is adjusted for baseline setback behavior. | **ELPC**: The current TRM value should be the Illinois-specific ENERGY STAR value of 14.8% adjusted for setback behavior determined using the analysis suggested below. If the analysis cannot be completed in time to update the IL TRM v 7.0, the TRM value for this measure should remain as is until the analysis can be completed. Moving forward, any research and analysis done by Navigant should focus solely on analyzing AMI data in conjunction with software such as Bidgely (which provides appliance-specific energy usage) to determine setback behavior for customers that do not have smart thermostats. The result of this data-driven analysis can then be used to adjust the Illinois-specific ENERGY STAR smart thermostat savings result of 14.8% to come up with a savings result for advanced thermostats for the TRM moving forward.<br><br>**Ameren**: Ameren Illinois Company disagrees with the replacement of the current value for cooling savings and joins in the comments and objections submitted by the Environmental Law and Policy Center with respect to this issue. Furthermore, Ameren Illinois is concerned that the value being proposed would be applicable to Ameren Illinois, but yet that value does not rely on analysis of data taken from the AIC service territory. Given the otherwise contested nature of the value, and the fact that it is based on data that is not representative of the entire state, Ameren Illinois cannot support its use as doing so could have a negative impact on the promotion of Advanced Thermostats and the savings that they can achieve for customers. | ELPC, Ameren Illinois |
| | Position Three | The TRM v7 cooling reduction value should be 14.8% based on the ENERGY STAR metric results from IL smart thermostat data. | **Ecobee**: the IL TRM Administrator should adopt the 14.8% IL-specific ENERGY STAR® cooling savings value that is based on an IL-specific ENERGY STAR calculation that ecobee disclosed. This value is based on an IL-specific ENERGY STAR calculation that ecobee disclosed to VEIC. We understand that, on Aug. 7, 2018, the IL TRM Administrator presented an ENERGY STAR IL-specific cooling value of 14.8% to the Technical Advisory Committee (TAC), which was an average of ecobee and Nest's individual IL-specific ENERGY STAR cooling savings values. As rationales for these objections, we previously highlighted our company's concerns with the evaluation's approach to self-selection bias and the regression methods used. This included issues with abnormal usage behavior in the matching period defined. In relation to the regression methods, we observed inconsistencies with baseload usage between the pre- and post-periods. Considering these continued concerns, we believe full adoption of the 14.8% IL-specific ENERGY STAR value in the final V 7.0 Advanced Thermostat document will be the best path forward. | Ecobee |

| Illinois Statewide TRM Version 7.0: Comparison Exhibit of Non-consensus Technical Items | | | | |
|---|---|---|---|---|
| **Item Description** | **Position Statement** | | **Rationale** | **Supporting Stakeholders** |
| | Position Four | The TRM v7 cooling reduction value should be 10.4% based on applying a baseline adjustment to the ENERGY STAR metric results from IL smart thermostat data. | **Nest**: Nest recommends the IL TRM v 7.0 use the EPA's ENERGY STAR® smart thermostat performance methodology to develop its deemed savings value for smart thermostats using data from Illinois. The ENERGY STAR® metric is a highly vetted, data-driven, national performance standard that is regularly updated by national stakeholders and requires smart thermostat manufacturers to submit testing information twice a year by climate zone. This approach has an advantage over other approaches that look at total energy use because it measures only what thermostats can control—the heating and cooling systems.<br><br>During the course of this stakeholder process, Nest and ecobee submitted data from existing Illinois smart thermostats using the ENERGY STAR® methodology. Averaged together, the Illinois-specific ENERGY STAR® score was a 14.8% reduction in cooling run time.<br><br>The one challenge for adapting the ENERGY STAR® methodology is that it compares real thermostat data against a fixed temperature schedule with no setbacks. Clearly, some households already do practice setback, either manually or with a programmable thermostat. However, prior research has shown that many consumers do not properly program conventional programmable thermostats or practice regular setbacks. It was that research that led EPA to rescind its ENERGY STAR® rating for programmable thermostats in 2009.<br><br>Until an Illinois specific baseline adjustment study is performed, Nest believes that it would be reasonable to assume that 30% of existing households have efficient setbacks. Reducing the 14.8% reduction by 30% equals 10.4%. This number is consistent with a host of studies across the country. It is also above the 10% annual runtime reduction for cooling that is the minimum threshold for achieving ENERGY STAR® status nationally. In addition, New York is using this 10% national minimum threshold number for its TRM value and the minimum threshold value has been proposed for use in Colorado as well.<br><br>To obtain Illinois specific data on setback behavior Nest recommends against relying solely on self-reporting surveys because people tend to over report behavior they perceive to be deemed "virtuous". Other approaches need to be used such as analysis of AMI data and potentially direct field observations of thermostat settings for a sample of participants in an existing direct install program. Nest remains committed to working with Illinois energy efficiency stakeholders to identify and implement emerging best practices in smart thermostat evaluation. | Google Nest |

# APPENDIX

## Attachments for Issue: Advanced Thermostat 'Percent Cooling_Reduction' assumption

### 1.1.1 First draft of VEIC memo documenting proposal to determine cooling reduction factor (6/26/2018)

**MEMORANDUM**

**TO:** **TECHNICAL ADVISORY COMMITTEE**

**FROM:** CHERYL JENKINS, PROJECT MANAGER, SAM DENT, TECHNICAL LEAD, and NICK LANGE, ADVANCED THERMOSTAT SUBCOMMITTEE LEAD - VEIC

**SUBJECT:** TRM VERSION 7 DRAFT – ADVANCED THERMOSTAT COOLING SAVINGS

**DATE:** **06/26/2018**

**Cc:** ANNETTE BEITEL, SAG

## Purpose of this memo

The Illinois TRM Advanced Thermostat Subcommittee has not yet reached a consensus agreement on the value for the "Cooling_Reduction" percentage. In the event that a consensus position cannot be determined prior to the date required to support the final draft of TRMv7, this memo describes a fallback value which would be used, absent any futher updates at the TRM Administrator's discretion as new information becomes available.

## Clarification

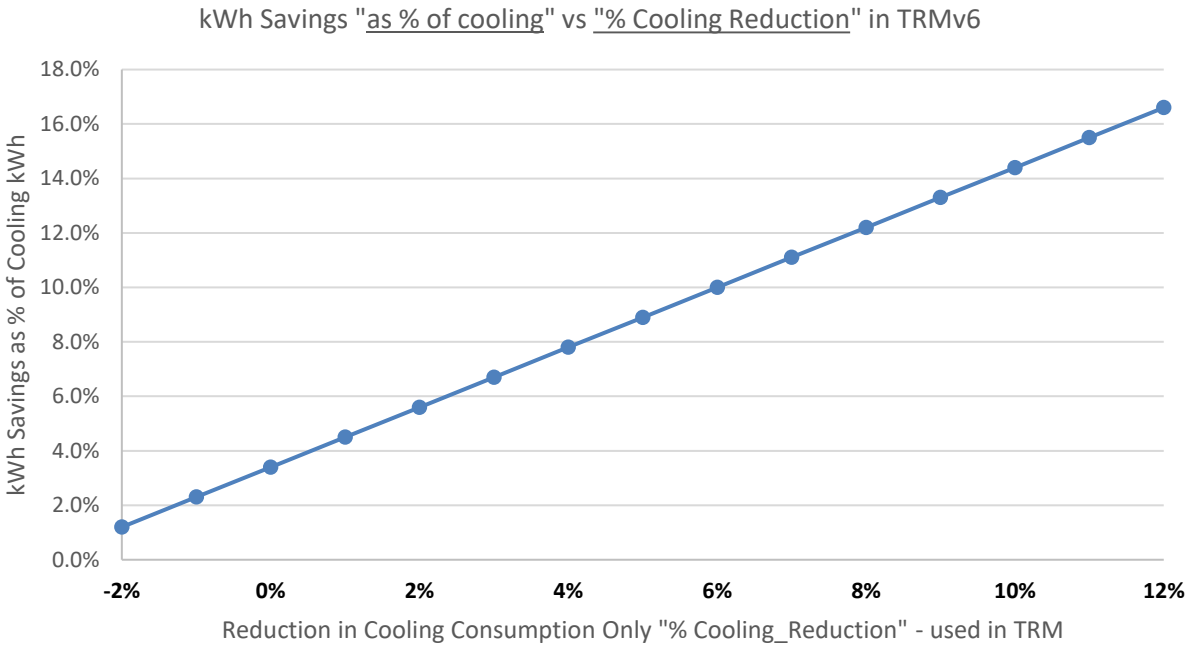
Before proceeding, it is essential to emphasize what "*Cooling_Reduction*" as defined by the IL TRMv6 means:

Cooling_Reduction = Assumed average percentage reduction in total household cooling energy consumption due to installation of the advanced thermostat

That is, this value is only intended to represent the fractional reduction in cooling energy. In contrast, many evaluations and studies often discuss the total kWh savings due to thermostat installation (which include non-cooling related kWh savings, such as reduced heating fan usage) as a percent of cooling usage. The key difference is that this latter representation (Total kWh savings as a percent of kWh used for cooling) will be larger than the *Cooling_Reduction* value used and described in the IL TRM.

*For example:*

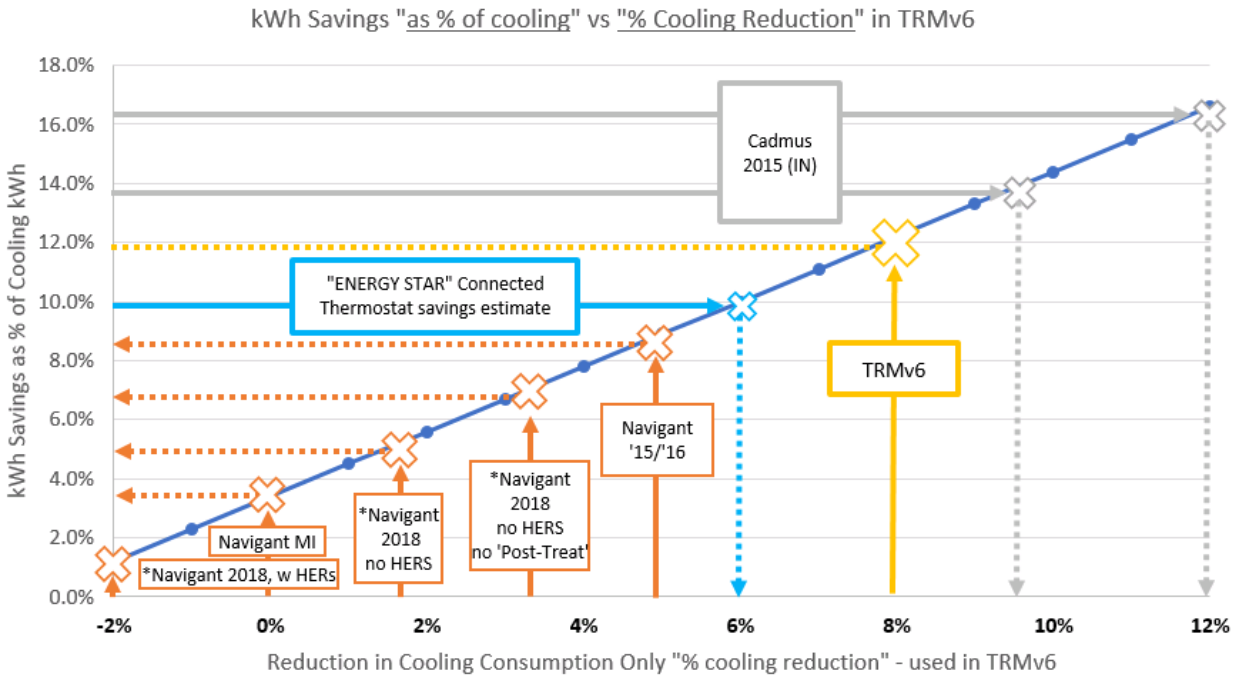
Based upon the average program participant characteristics provided by Navigant as part of the ongoing evaluation, the figure below represents the relationship between *Cooling_Reduction %* value used, and the resulting total kWh saved according to the TRM (which also includes heating fan energy savings) as a % of cooling load.[1]




## Assessing Different Estimates of Cooling Savings Values

Using this IL TRM relationship between *Cooling_Reduction* percentages and the more typical "total kWh savings as percent of cooling load" the different savings values can be better compared in context. For example, the following chart shows the TRMv6 value, ENERGY STAR's national average savings estimate, Navigant's evaluation outputs from IL and MI, and Cadmus' evaluations from Indiana. For clarity, for each source, the study value used is shown with a solid line, with a dotted line provided to translate into the corresponding percentage:

[1] For the purposes of generating this chart, a cooling load of 1940kWh was used. This is an average of the inferred loads calculated by using TRM values and Navigant's outputs of % cooling savings and associated cooling kWh saved from recent evaluations. These values ranged between 1,771 and 2,125 kWh.




Not shown are the results from a 2017 Nexant Evaluation in CO for Xcel Energy[2] which found a range of total kWh savings of ~200-300 kWh or 2-3% *compared to total household use*. Though there are too many variables and unknowns to provide point estimates at this time, using an estimated cooling range of cooling load from 20-50% of household usage suggests a range of savings on the order of 4-15% total kWh savings as a % of cooling load.

## Determining the "Fallback" Cooling Reduction Value

As discussed on multiple subcommittee calls there is an interest in providing a more transparent approach to the determination of the TRM *Cooling_Reduction* value. In support of that goal, and also discussed within the subcommittee, would be a more systematic way of addressing the empirical uncertainty and divergent views across the group. We propose using a weighted average of savings values, and commentary on why those weights were chosen. This provides a clearer way to communicate 'why' and 'how' savings values were established, and provides a structure to more clearly address differences in opinion and evolving understanding of broader evidence as it becomes available.

## Establishing Categories for Simple Weighting

As a simplification, we defined categories of savings values that would each receive weights: 1) Existing TRM value – for stability in program offerings in light of significant uncertainty, 2) Findings from IL-based studies – for representativeness, and 3) Findings from studies not based in IL – for breadth and diversity. Within each category, we include findings discussed on subcommittee calls.

## Category Savings Values

The next step is to establish which *Cooling_Reduction* % values to set for each category. Note that it is important to be consistent across studies, so for each case we are using the IL TRM equivalent % of cooling consumptions savings value

[2] https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/CO-Smart-Thermostat-Pilot-Evaluation.PDF

(e.g. Cadmus' 16% savings finding from NIPSCo becomes it's *Cooling_Reduction* of 12% corollary). The category values are simple averages, with no differential weightings applied within the category:

| Category | Savings Values |
|---|---|
| **Existing TRM** | **8%** (per version 6) |
| **IL Findings** | **3.3%** (average of below) |
| | 4.8% Navigant's 2015/2016 findings |
| | 1.7% Navigant's 2017/2018 outputs w/out HERs and with agreed-upon model |
| **Non-IL Findings** | **7.7%** (average of below) |
| | 12% Cadmus – NIPSCo (IN) |
| | 8.8% Cadmus – Vectren (IN) |
| | 10% ENERGY STAR (US) |
| | 0% Navigant – DTE (MI) |

## Category Weights

The final step is to apply subjective, but informed, professional judgement to determine the relative weightings given to these values. In support of the purpose of this "Fallback" non-consensus position, VEIC is proposing these weightings:

| Category | Weighting | Notes |
|---|---|---|
| **Existing TRM** | **50%** | Relatively High - To dampen the negative market and program planning impacts in dynamic and uncertain conditions (savings estimates of advanced thermostats) |
| **IL Findings** | **40%** | Relatively High – Most representative of buildings & HVAC, climate, population, and program design. Not higher due to evaluation report not provided and associated challenges which limit understanding of, confidence in, and application of results. |
| **Non-IL Findings** | **10%** | Relatively Low – Not very representative of IL. |

## Result

Based on the above values, VEIC proposes 6% as the "fallback" *Cooling_Reduction* value for TRMv7 if further consensus is not reached. The TRM Administrator welcomes feedback in support of improving upon this value as new information is available.

## 1.1.2 Comments received following VEIC first deliverable

## Ecobee:

This is intended to reiterate and follow-up on the feedback we provided by email last month (June 28). We understand that this feedback will inform the IL Technical Reference Manual (TRM) Administrator's final V 7.0 IL Statewide TRM recommendations and the associated Advanced Thermostat measure savings values.

• As communicated, we would like the Navigant DTE study conducted for Michigan utility programs removed from the "Non-IL Findings" weighting. The Michigan Public Service Commission (MPSC) has not adopted and accepted the results.

• We can provide new Illinois customer and climate-specific ENERGY STAR® percent savings results that will support an improved cooling reduction value. In this case, similar to Nest, we recommend that the IL TRM Administrator average Nest and ecobee's IL-specific ENERGY STAR scores, and include these results in within the "IL Findings" category alongside the Navigant findings.

Thank you,

Nkechi Ogbue Manager, Regulatory Affairs nkechio@ecobee.com

ELPC:

ELPC is concerned about the methodology that has been used to calculate the fallback position.

First and foremost, Navigant's evaluation in Michigan should not be included in the non-Illinois findings as stakeholders have flagged several of the same issues with that study as the Illinois study and including it would be double counting and not objective. Furthermore, the Michigan Public Service Commission decided not to incorporate the results of Navigant's Michigan study on advanced thermostats given these issues. This should be removed.

Secondly, the IL findings should include the results of the ICC's requested adjustments to Navigant's model. These adjustments resulted in a cooling savings value of 3.2%. This should be averaged with the 1.7% from Navigant's study for a 2017/2018 output of 2.45%.

Lastly, ecobee and Nest have run the ENERGY STAR metric for Illinois and made this dataset available to VEIC. The resulting value should be weighted equally with Navigant's results in the IL findings category.

These adjustments result in a fallback position of at least 7.34% using the suggested category weights of 50% for the existing value, 40% for the Illinois findings and 10% for the non-Illinois findings.

Existing TRM - 8% (IL TRM v 6)

IL Findings - 5.75% (average of below)

4.80% Navigant's 2015/2016

2.45% Navigant's 2017/2018 outputs w/out HERs and with agreed- upon model averaged with the ICC's requested adjustments

10% Placeholder for manufacturer ENERGY STAR Illinois specific data

Non-IL Findings - 10.4% (average of below)

12% NIPSCO (IN)

8.80% Vectren (IN)

Fallback position 7.34% (to be updated with actual ENERGY STAR Illinois data)

## Nest:

The following is Nest's feedback on the proposed fallback savings value:

● We concur with Ecobee's position that the MI study should not be included in "other studies" since it has not been finalized nor accepted by their statewide EE stakeholder group.

● Nest can also provide new IL-specific ENERGY STAR numbers. Nest and Ecobee's IL-specific ENERGY STAR scores should be averaged and included in the Illinois specific category alongside the Navigant findings.

● ENERGY STAR should not be included in the "other study" category, but rather be included as an independent category. The ENERGY STAR Connected Thermostat standard is a highly vetted, data-driven, national, performance standard that is the sole basis of some TRMs, including in New York state. As a result, it is not simply another non-IL stand alone study but is in its own category and should be weighted separately.

● The adjustments made to the two Indiana studies are based on the relative expected fraction of electricity savings during the cooling season for Illinois. But those studies were conducted in Indiana where heating loads are smaller and cooling loads larger and so they should receive a different adjustment that reflects the larger proportion of total electricity savings expected from cooling. Using the data provided in the studies, we calculate that the adjusted % cooling savings should be 12.2% for Vectren and 12.8% for NIPSCo (heating season electric savings were calculated using the reported gas savings and assuming an average 80 kbtu/hr furnace with a 600W furnace power draw).

Sincerely,

Jamie Peters

Customer Success - Energy Partnerships | Google jamiepeters@google.com

Nest Comments on Illinois Smart Thermostat Study Fallback Value - July 11, 2018

## Navigant:

We're attaching an excel file of other secondary literature that might be more relevant (2016 or newer and third-party studies). That said, even if we only average IL specific studies with the TRM value, we'll get about 5-6%. We suggest holding a call to discuss this number and approach, where it might be helpful to start by sharing the secondary literature.

Navigant Smart Thermostat Literatur

## 1.1.3 Second draft of VEIC memo documenting proposal to determine cooling reduction factor (8/7/2018)

**MEMORANDUM**

**TO:** **TECHNICAL ADVISORY COMMITTEE**

**FROM:** CHERYL JENKINS, PROJECT MANAGER, SAM DENT, TECHNICAL LEAD, and NICK LANGE, ADVANCED THERMOSTAT SUBCOMMITTEE LEAD - VEIC

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**DATE:** **06/26/2018 (UPDATED PER 8/7 TAC CALL)**

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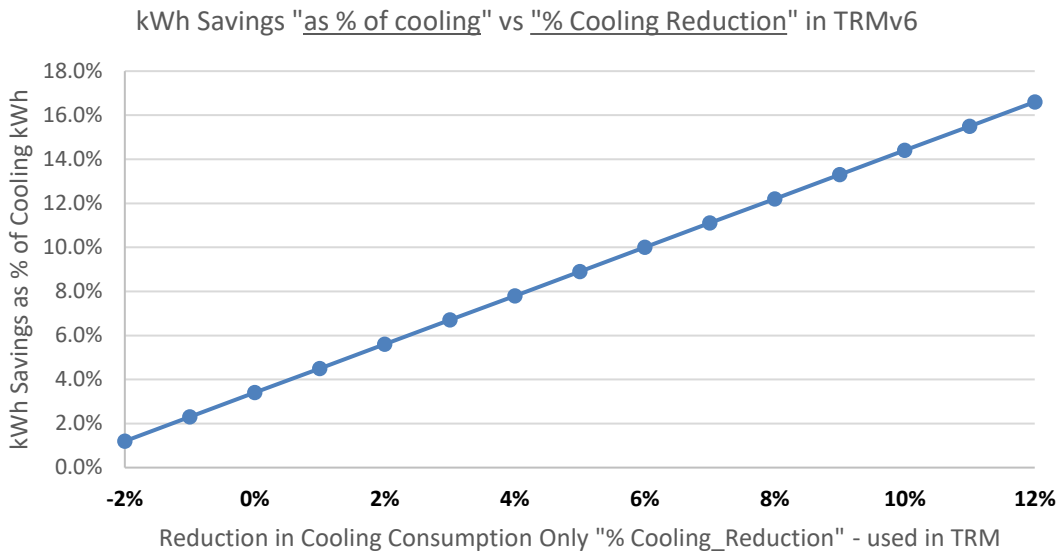


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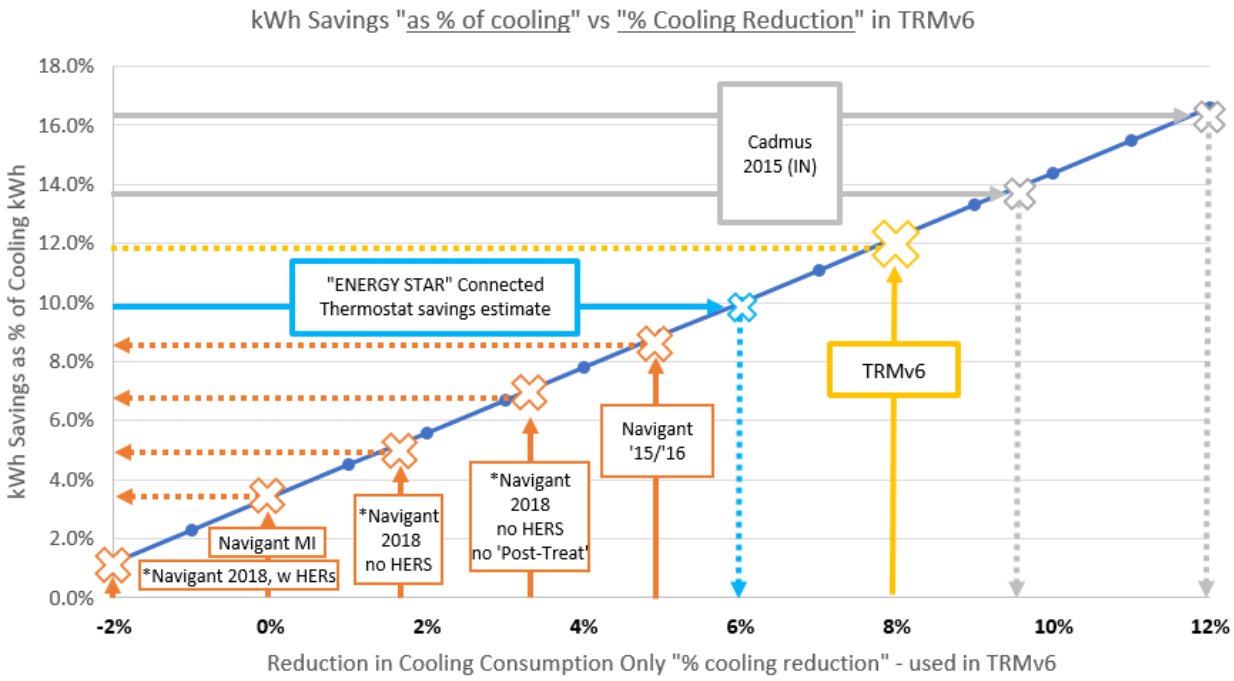


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[4] The graphic does not reflect comment submittals adjustments for heating and cooling load values in IN

[5] https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/CO-Smart-Thermostat-Pilot-Evaluation.PDF

## Determining the "Fallback" Cooling Reduction Value

As discussed on multiple subcommittee calls there is an interest in providing a more transparent approach to the determination of the TRM *Cooling_Reduction* value. In support of that goal, and also discussed within the subcommittee, would be a more systematic way of addressing the empirical uncertainty and divergent views across the group. We propose using a weighted average of savings values, and commentary on why those weights were chosen. This provides a clearer way to communicate 'why' and 'how' savings values were established, and provides a structure to more clearly address differences in opinion and evolving understanding of broader evidence as it becomes available.

## Establishing Categories for Simple Weighting

As a simplification, we defined categories of savings values that would each receive weights: 1) Existing TRM value – for stability in program offerings in light of significant uncertainty, 2) Findings from IL-based studies – for representativeness, and 3) Findings from studies not based in IL – for breadth and diversity. Within each category, we include findings discussed on subcommittee calls.

## Category Savings Values

The next step is to establish which *Cooling_Reduction* % values to set for each category. Note that it is important to be consistent across studies, so for each case we are using the IL TRM equivalent % of cooling consumptions savings value (e.g. Cadmus' 16% savings finding from NIPSCo becomes it's *Cooling_Reduction* of 12.8% corollary). The category values are simple averages, with no differential weightings applied within the category:

| Category | Savings Values |
|---|---|
| **Existing TRM** | **8%** (per version 6) |
| **IL Findings** | **3.6%** (average of below) |
| | 4.8% Navigant's 2015/2016 findings |
| | 2.45% (an average of Navigant's 1.7% and 3.2% outputs w/out HERs for the agreed-upon model, with and without the post-treatment term) |
| **Non-IL Findings** | **8.8%** (average of below) |
| | 12.8% Cadmus – NIPSCo (IN) |
| | 12.2% Cadmus – Vectren (IN) |
| | 10% ENERGY STAR (US) |
| | 0% Navigant – DTE (MI) |

## Category Weights

The final step is to apply subjective, but informed, professional judgement to determine the relative weightings given to these values. In support of the purpose of this "Fallback" non-consensus position, VEIC is proposing these weightings:

| Category | Weighting | Notes |
|---|---|---|
| **Existing TRM** | **50%** | Relatively High - To dampen the negative market and program planning impacts in dynamic and uncertain conditions (savings estimates of advanced thermostats) |
| **IL Findings** | **40%** | Relatively High – Most representative of buildings & HVAC, climate, population, and program design. Not higher due to evaluation report not provided and associated challenges |

| | | |
|---|---|---|
| | | which limit understanding of, confidence in, and application of results. |
| **Non-IL Findings** | **10%** | Relatively Low – Not very representative of IL. |

## Result

Based on the above values, VEIC proposes 6.3% as the "fallback" *Cooling Reduction* value for TRMv7 if further consensus is not reached. The TRM Administrator welcomes feedback in support of improving upon this value as new information is available.

## 1.1.4 Comments received following VEIC second deliverable

### Nest:

Nest suggests referencing ENERGY STAR® for the smart thermostat savings value. The ENERGY STAR® metric is a highly vetted, data-driven, national performance standard and forms the sole basis for other statewide TRMs such as New York. This approach benchmarks to a dynamic standard that is regularly updated by national stakeholders and requires smart thermostat manufacturers to submit testing information twice a year by climate zone.

Sincerely,

Will Baker

Customer Success - Energy Partnerships | Google jwillbaker@google.com

### ELPC:

ELPC disagrees with the fallback savings value that has been forth of 6.3% for the advanced thermostat measure because it disregards the highly vetted, data-driven Illinois-specific ENERGY STAR smart thermostat savings result of 14.8% which has been put forward by the manufacturers to inform this analysis. It should be noted that the last TRM states, "EPA's EnergyStar program is developing a new specification for the project category, and if/when evaluation results demonstrate consistent cooling savings, subsequent versions of this measure will revisit this assumption."

ELPC is generally concerned about the lack of data-driven methods in Navigant's analysis and survey and the complete disregard for smart metered data. Illinois ratepayers have paid for the installation of millions of smart meters, yet Navigant chooses not to use this data to inform this analysis or to assess setback behavior to adjust ENERGY STAR savings results. Rather, Navigant has relied on an archaic monthly billing analysis methodology and survey results, neither of which are the right approach to value the advanced thermostat measure.

ELPC opposes the adjustments Navigant proposed to Illinois ENERGY STAR results that reduce savings by 50%. Regarding setback behavior, it should be noted that the last Illinois TRM had recognized the cooling savings

from programmable thermostats as zero. See TRM 5.0 at 129. It should also be noted, however, that even if Navigant's unrealistic survey results are used (that show 50% of people accurately setback their thermostats which completely contradicts their prior analyses of programmable thermostats as providing zero value because they aren't setback) and averaged with the smart thermostat focus group results (that show setback behavior is 40%), that would result in a savings value of 8.14% (.148 * .55). This value is slightly higher than the current TRM value of 8%.

ELPC also asserts that the net-to-gross value should be 1 or very close to 1. Before this program consumers only rarely shopped for thermostats. They replaced thermostats when they purchased a new HVAC unit or their thermostat failed. It should also be noted that ComEd, Nest and Ecobee have spent tremendous resources on marketing smart thermostats in Illinois. Even if a customer would purchase a smart thermostat without the rebate, their awareness of the technology was driven by the program which dedicated significant marketing spend to educating customers about the device.

Moving forward, any research and analysis done by Navigant should focus solely on analyzing AMI data in conjunction with Bidgely (which provides appliance-specific energy usage) to determine setback behavior. The result of this data-driven analysis can then be used to adjust the Illinois-specific ENERGY STAR smart thermostat savings result of 14.8% to come up with a savings result for advanced thermostats for the TRM moving forward.

For now, ELPC proposes using the Illinois-adjusted ENERGY STAR savings value of 14.8%. If VEIC believes it should adjust those values to account for customers who previously setback their thermostats, the adjustment should be much smaller than 50% and informed by a data-driven approach as suggested above. The adjustments should not be based on customer surveys which are unreliable. At an absolute minimum, the cooling savings value for the advanced thermostat measure should remain at 8%.

In the future, savings values should be calculated using the Illinois-specific ENERGY STAR methodology and adjusted based on a data-driven analysis to determine setback behavior using AMI data and Bidgely. With advanced technologies and measurement techniques available, we should only rely on customers surveys when better alternatives don't exist.

## Ecobee:

Version 7.0 of the TRM should adopt the minimum savings values for heating and cooling prescribed in the ENERGY STAR® Program Requirements for Connected Thermostats (CTs) Version 1.0. We continue to assert that the rationales provided for the 6.3% Cooling Savings Factor (CSF) are misguided and misleading.1

To further support this position, we disclosed that average Illinois ecobee customers' cooling savings over the past year far exceed the 8% minimum CSF that is included in the current V 6.0 protocol. If the IL TRM Administrator adopted the additional CSF information provided by manufacturers, the final proposed value for the V 7.0 TRM would likely be higher – and much closer to the current 8%.

Given the ongoing challenges with the methodology, ecobee remains steadfast in requesting the use of the ENERGY STAR metric's savings floors for cooling and heating.

In addition, going forward, as suggested by the Environmental Law and Policy Center (EPLC), we recommend that the evaluator conclude any further use of the billing analysis approach and incorporate ComEd customer

smart meter data – particularly since a larger proportion of customers will now have Advanced Metering Infrastructure (AMI) installed.

Thank you,

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