

## 1. Introduction & Purpose

The purpose of this Technical Reference Manual (TRM) is to provide a standardized and transparent basis for calculating and claiming energy (kWh or therms) and capacity (kW) savings implemented through the State of Illinois' energy efficiency programs<sup>1</sup>. To this end, the Vermont Energy Investment Corporation (VEIC) was retained by the Illinois Energy Association (IEA) on behalf of the Department of Commerce and Economic Opportunity (DCEO) and the state's electric and gas utilities<sup>2</sup> to prepare this TRM for statewide use.

This document represents Illinois' first statewide TRM, and is intended to fulfill a series of objectives, including:

- "Serve as a common reference document for all utilities, stakeholders, utilities, and the Commission, so as to provide transparency to all parties regarding savings assumptions and calculations and the underlying sources of those assumptions and calculations.
- Support the calculation of the Illinois Total Resource Cost test (TRC), as well as other cost-benefit tests in support of program design, evaluation and regulatory compliance. Actual cost-benefit calculations and the calculation of avoided costs will not be part of this TRM.
- Identify gaps in robust, primary data for Illinois, that can be addressed via evaluation efforts and/or other targeted end-use studies. Recommend a process for periodically updating and maintaining records, and preserve a clear record of what deemed parameters are/were in effect at what times to facilitate evaluation and data accuracy reviews.
- Provide standard protocols for determining energy savings for some common custom projects, as appropriate.<sup>3</sup>
- "...support coincident peak capacity (for electric) savings estimates and calculations for electric utilities in a manner consistent with the methodologies employed by the utility's Regional Transmission Organization ("RTO"), as well as those necessary for statewide Illinois tracking of coincident peak capacity impacts."<sup>4</sup>
- Provide a standardized, statewide methodology for calculating prescriptive<sup>5</sup> energy and capacity savings, which gives independent evaluators a consistent framework from which to evaluate the savings achieved for the Illinois energy efficiency portfolios.

The TRM is a policy document. As such, it will be filed with the Illinois Commerce Commission (ICC), who will approve and/or modify it through an Order. Consensus on the content of the TRM will be sought through the Stakeholder Advisory Group (SAG) process prior to each TRM filing. However, the TRM Administrator may include ~~any~~ changes related to measure savings that it believes are appropriate prior to filing it with the ICC<sup>6</sup>.

<sup>1</sup> Specifically, this TRM has been developed to help determine compliance with the energy efficiency requirements of the Illinois Public Utilities Act (220 ILCS 5), Sections 8-103 and 8-104

(<http://www.ilga.gov/legislation/ilcs/ilcs5.asp?ActID=1277&ChapterID=23>)

<sup>2</sup> In addition to DCEO, the utilities include; Ameren Illinois, ComEd, Peoples Gas, Peoples North Shore and NICOR.

<sup>3</sup> Illinois Statewide Technical Reference Manual Request for Proposals, August 22nd, 2011, pages 3-4, "TRM\_RFP\_Final\_part\_1.230214520.pdf"

<sup>4</sup> Ibid.

<sup>5</sup> Protocols are also included to provide a consistent framework for calculating and evaluating custom measures and projects.

<sup>6</sup> The TRM Administrator's role and authority to file the TRM with the ICC has not been firmly established, but has been implied by the ICC ~~staff's~~ Staff's comments. As a result, the presumption has been made here to call out the issue and the role of the TRM Administrator in particular. Alternatively, the utilities and DCEO may file a joint

## 1.1. Development Process

The measure characterizations in this TRM are the result of a rigorous quantitative and qualitative analysis. The quantitative analysis took the form of a dynamic spreadsheet model of the engineering algorithms for measure-level savings. These models were used to perform a sensitivity analysis on all of the algorithms' parameters, and have been reviewed weekly with the Illinois Stakeholder Advisory Group<sup>7</sup> (SAG) Technical Advisory Committee (TAC) since December 2011. The qualitative analysis includes the results of the quantitative analysis, and the result is the written measure characterizations in this document which are supported by referencing source documents for each of the parameters within the savings algorithm.

This document is a result of an ongoing SAG review process ~~involving the Illinois Commerce Commission (ICC) and Commission Staff (Staff or ICC Staff), and the SAG (of which ICC Staff is also considered a member)~~. VEIC met with the SAG and/or its TAC weekly beginning in December 2011 to create a high level of transparency into the development of this TRM. The purpose of the weekly reviews was to maximize the level of collaboration and visibility into the measure characterization process. Where consensus did not emerge on specific measures or issues, this TRM contains VEIC's recommended approach along with the usual source documentation and rationale. In keeping with the goal of total transparency, a summary of the comments and their status to-date has been compiled under separate cover<sup>8</sup>.

The analytical team noticed that many of the existing measures in Illinois represent discrete cases within a range of measure possibilities across Market Sectors, End Uses, Measures & Technologies, Programs and Fuels. This document has consolidated these measures in such a way that discrete measures can be captured within a more generalized format where only individual parameters in the savings algorithm need to be changed to arrive at the savings claim for a discrete case.

Finally, the measure titles used in this TRM may not match exactly the titles that utility programs use. An organizational structure, described in the next section, gives details about how measures are grouped, categorized, and described. Non-Residential lighting measures and LED lighting in particular have been restructured and generalized to incorporate a wide array of potential measures, many of which are not yet available in Illinois.

## 1.2. TRM Implementation & ICC Policy

Each utility's Order that enables it to implement energy efficiency programs provides guidance concerning the TRM. Generally speaking, these Orders describe the TRM's creation and maintenance as being a collaborative process between the utilities and the SAG. Furthermore, none of the Orders state a requirement for the Commission to approve the TRM.

The TRM is assumed to be a prospective, forward looking document. Although it is not explicitly required, the initial TRM is expected to be filed with and approved by the ICC because a series of TRM related implementation

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petition with the ICC for the TRM's approval.

<sup>7</sup> The Illinois Stakeholder Advisory Group was defined in the Ameren Illinois and ComEd Orders (dockets 07-0539 and 07-0540) as "... representatives from Ameren, DCEO, Staff, the Attorney General, and CUB and representation from a variety of interests including residential consumers, business consumers, environmental and energy advocacy organizations, trades and local government. In reference to the SAG and the TRM process, the Ameren Illinois Order (docket 10-0568) states, "With regard to any suggestion that the SAG should have ultimate responsibility for development of the TRM, Ameren and the SAG should work toward the development of the TRM together". The Ameren Illinois Order on Rehearing (docket 10-0568) states, "The Commission directs that Ameren will work with other utilities subject to the requirements of Section 8-103 and 8-104 of the PUA and the SAG to develop a statewide TRM for use in the upcoming energy efficiency three-year plan cycle.

<sup>8</sup> All comments that were submitted throughout the TRM development process are posted to the VEIC Sharepoint website under the "Comments\_on\_Draft\_Deliverables" folder.

issues require the ICC's guidance. Once the ICC clarifies how the TRM is to be implemented, further approvals for its future implementation may not be required.

Consistent with Commission policy, the utilities and DCEO have the flexibility to add, change or retire measures from their programs unilaterally as markets, technology and evaluation results change. This does not mean that an implementer may make unilateral changes to the TRM itself, however. Only the TRM Administrator, working through the SAG, can make a change to the TRM.

## 2. Using the TRM

For each measure characterization, this TRM includes engineering algorithm(s) and a value(s) for each parameter in the equations<sup>9</sup>. These parameters have values that fall into one of three categories: a single deemed value, a lookup table of deemed values or an actual value such as the capacity of the equipment. The TRM makes extensive use of lookup tables because they allow for an appropriate level of measure streamlining and customization within the context of an otherwise prescriptive measure.

Accuracy is the overarching principle that governs what value to use for each parameter. When it is explicitly allowed within the text of the measure characterization, the most accurate value is always the actual or on-site value for the individual measure being implemented. The *deemed values*<sup>10</sup> in the lookup tables are the next most accurate choice, and in the absence of either an actual value or an appropriate value in a lookup table, the single, *deemed value* should be used. As a result, this single, *deemed value* can be thought of as a default value for that particular input to the algorithm.

A single *deemed savings estimate* is produced by any given combination of an algorithm and the allowable input value for each of its parameters. In cases where lookup tables are provided, there is a range of deemed savings estimates that are possible, depending on site-specific factors such as equipment capacity, location and building type.

Algorithms and their parameter values are included for calculating claimed:

- Gross annual electric energy savings (kWh)
- Gross annual fossil fuel energy savings (therms)
- Gross electric summer coincident peak demand savings (kW)

To support cost-effectiveness calculations, parameter values are also included for:

- Incremental costs (\$)
- Measure life (years)
- Operation and maintenance costs (\$)
- Water (gal) and other resource savings where appropriate.

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<sup>9</sup> As noted in the RFP, the net-to-gross ratios are provided by the utilities and are listed in the appendices. Place holders for rebate and incentive amounts may also be included in a subsequent draft.

<sup>10</sup> Emphasis has been added to denote the difference between a "deemed value" and a "deemed savings estimate". A deemed value refers to a single input value to an algorithm, while a deemed savings estimate is the result of calculating the end result of all of the values in the savings algorithm.

To facilitate the use of the TRM as measures are revised, updated, and removed, a unique code is provided for each measure that identifies the measure and the applicable installed program year<sup>11</sup>.

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## Stakeholder Roles and Responsibilities

Each stakeholder in the SAG has a role to play in the update process, and we have categorized them into six discrete roles and a series of responsibilities that need to be filled to manage changes to the TRM.

1. **Evaluator** (Independent Consultant) – Whose primary responsibility pursuant to 220 ILCS 5/8-103(f)(7) and 220 ILCS 5/8-104(f)(8) is to provide independent evaluations of the performance and cost effectiveness of the utilities’ energy efficiency portfolios. The Evaluator ~~may~~will also make recommendations for TRM changes that support this responsibility, as needed. The Evaluator conducts primary research to help improve the reliability and credibility of the TRM values and collaborates with the Implementer prior to the start of each program year to determine an appropriate balance of data collection in the upcoming program year to support these evaluations while minimizing unnecessary administrative cost and burden.
2. **ICC Staff** – Whose primary responsibility is to make recommendations to the Commission. ICC Staff observe TRM update proposals and negotiations and participate in the TRM Technical Advisory Committee.
3. **Illinois Commerce Commission** (ICC or Commission or Regulator) – Whose primary responsibility is to approve, modify, or deny proposed changes to the TRM. The official TRM will be posted on the Commission’s website after it has been approved.
4. **Implementer** (Utility) – Whose primary responsibility is to implement programs, track and report savings, estimate cost effectiveness and implement the TRM through its tracking system.
5. **TRM Administrator** (Independent Consultant) – Whose primary responsibility is to manage changes to the TRM document related to measure savings, facilitates the TRM Technical Advisory Committee (TAC), and serves as an independent technical resource.
  - a. The TRM Administrator files proposed updated TRM with the Commission each year in the proper proceeding and files testimony describing the basis of the updates, including the results of any recent and applicable evaluations.
  - b. The TRM Administrator updates the TRM each year to reflect Commission Orders from the TRM Update proceedings.
6. **TRM Technical Advisory Committee** (TAC) – The TAC is a subcommittee of the SAG whose primary responsibility is to provide a forum to facilitate consensus for TRM changes among the utilities, portfolio administrators, program implementers, evaluators, and other stakeholders.
7. **Other Stakeholders** – Who may participate in the SAG or TAC as directed by the Implementer.
  - a. **Portfolio Administrator** - Examples include WECC, Franklin Energy, SAIC, CSG, ComEd, etc.

**Comment [r1]:** CUB agrees with the AG that the organization of this section, as well as table 2.5, privileges the role of certain stakeholders more than others. It should be made explicit that those stakeholders represent consumer and environmental interests, and that the Commission clearly intended for the TRM to be developed collaboratively with SAG participation so that these interests would be represented. It was my understanding that the stakeholders listed here in numbers 1-7 were all members of the TAC, as the TAC is fluid and inclusive, like the SAG, so again, this organization seems inverted and lacking in necessary comprehensiveness.

<sup>11</sup> The coding system is not defined in this draft and will be proposed and discussed at an upcoming SAG meeting.

b. **Program Implementer** - Examples include KEMA, JACO, Honeywell, OPower, Efficiency 2.0, etc.

The TRM will need to be updated whenever a new measure or technology is being proposed and anytime an existing measure changes or is retired. Specifically, the need to update a measure within the TRM can be driven by a number of events, including but not limited to:

- Results of program evaluations
- Impact of code or legislative changes to specific measures
- Introduction of new technologies
- Discovery of errors in existing measures

Table 2.15: Specific Responsibilities of Each Stakeholder in the TRM Update Procedure

Role	Change Existing Measure (1)	Create New Measures (2)	Retire a Measure (3)
<b>Evaluator</b> (Consultant)	<p>Provides rigorous reviews of savings algorithms and program designs. Offers a professional opinion on other parties' recommendation.</p> <p>Reviews and suggests changes to the recommendation that will likely result in improved accuracy and reliability of savings estimates.</p> <p>Identifies and recommends changes as part of the annual evaluations.</p> <p>Provides recommendations in a standardized format with supporting workpapers to the TRM Technical Advisory Committee and TRM Administrator.</p> <p>Identifies and recommends changes based on ongoing reviews of measures and markets. Coordinates with other utilities' evaluation teams.</p>	<p>Provides new measure recommendations during the evaluation process. Offers a professional opinion on other parties' recommendations.</p> <p>Reviews and suggests changes to the recommendation that will likely result in improved accuracy and reliability of savings estimates.</p> <p>Identifies and recommends new measures for TRM inclusion as part of the annual evaluations.</p> <p>Identifies and recommends new measures for TRM inclusion based on ongoing reviews of measures and markets.</p> <p>Provides recommendations in a standardized format with supporting workpapers to the TRM Technical Advisory Committee and TRM Administrator. Coordinates with other utilities' evaluation teams.</p>	<p>Provides recommendations for measure retirements. Offers a professional opinion on other parties' recommendations to retire measures.</p> <p>Identifies measure as potential retirement candidate or need for further study as part of the annual evaluations.</p> <p>Identifies and recommends measure retirement based on ongoing reviews of measures and markets.</p> <p>Provides recommendations in a standardized format with supporting workpapers to the TRM Technical Advisory Committee and TRM Administrator. Coordinates with other utilities' evaluation teams.</p>
<b>ICC (Regulator)</b>	Approves, modifies or denies requests for changes to existing measures.	Approves, modifies or denies requests for additions of new measures.	Approves, modifies or denies dates for measure retirements.
<b>ICC Staff</b>	<p>Makes recommendations to the Commission regarding the TRM Administrator's filed TRM Updates.</p> <p>May make recommendations to the Commission for changing existing measures. May recommend modifications to proposed changes to existing measures recommended by a party for inclusion in the TRM Update proceeding.</p> <p>Participates in TRM Technical Advisory Committee.</p>	<p>Makes recommendations to the Commission regarding the TRM Administrator's filed TRM Updates.</p> <p>May make recommendations to the Commission for new measures. Participates in TRM Technical Advisory Committee.</p>	<p>Makes recommendations to the Commission regarding the TRM Administrator's filed TRM Updates.</p> <p>May make recommendation to the Commission for measure retirement. Participates in TRM Technical Advisory Committee.</p>

Role	Change Existing Measure (1)	Create New Measures (2)	Retire a Measure (3)
<b>Implementer (Utility)</b>	<p>Updates its tracking systems and modifies its measure calculations <u>in conjunction with consensus- building processes in the TAC and approval from the TRM Administrator,</u> and provides measure update recommendations.</p> <p>Documents the recommendation, performs analysis and justification work. Provides recommendation in a standardized format agreed to by parties along with supporting workpapers.</p> <p><del>Facilitates review process with Evaluator. Facilitates review process with other Illinois utilities/implementers and their evaluation teams.</del></p>	<p>Updates its tracking systems <u>in conjunction with consensus- building processes in the TAC and approval from the TRM Administrator,</u> and provides new measure recommendations.</p> <p>Defines the algorithm and conducts the sensitivity analysis. Documents recommendation, analysis and justification. Provides recommendation in a standardized format agreed to by parties along with supporting workpapers.</p> <p><del>Facilitates review process with Evaluator. Facilitates review process with other Illinois utilities/implementers and their evaluation teams.</del></p>	<p>Retires the measure in its tracking system and reduces the scope for its implementation contractor(s) <u>in conjunction with consensus- building processes in the TAC and approval from the TRM Administrator.</u></p> <p>Documents the recommendation, performs analysis and justification work. Provides recommendation in a standardized format agreed to by parties along with supporting workpapers.</p> <p><del>Facilitates review process with other Illinois utilities/implementers and their evaluation teams</del></p>
<b>TRM Administrator (Independent Consultant)</b>	<p>Manages the TRM. Facilitates and reviews recommendations from other parties as part of the TRM Technical Advisory Committee forum. Files TRM Administrator recommendations for TRM Updates with the Commission by 'specific' date every year. In the absence of a recommendation, the TRM Administrator must still file a petition with the Commission regarding TRM Updates explaining why it has no recommendations. Parties are free to make their own recommendations in response, even if TRM Administrator has zero recommendations.</p>	<p>Manages the TRM. Files TRM Administrator recommendations for TRM Updates with the Commission by 'specific' date every year. Reviews recommendations from other parties as part of the TRM Technical Advisory Committee forum.</p>	<p>Removes measure from the TRM. Manages the TRM. Files TRM Administrator recommendations for TRM Updates with the Commission by 'specific' date every year. Reviews recommendations from other parties as part of the TRM Technical Advisory Committee forum.</p>
<b>TRM Technical Advisory Committee (TAC)</b>	<p>Provides a forum to facilitate consensus for the recommended changes.</p>	<p>Provides a forum to facilitate consensus for the new measure.</p>	<p>Provides a forum to facilitate consensus for the measure retirement.</p>

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**Comment [r2]:** Utility facilitation of review processes with evaluators is antithetical to the independence of the evaluator.

## 2.1. The TRM's Role in Program Planning

Some of the characterizations provided may have impacts on preexisting program designs and planning, most notably when an existing measure has been identified for retirement due to a baseline change. Because the TRM is intended to be a statewide document that is as accurate as possible with respect to the current state of technology, the characterizations presented are not limited to those measures included in existing program designs and planning. Instead, the TRM provides an in-depth characterization of the technologies, without the varied constraints of the existing programs. As a result, program implementers can select measures that are applicable to their programs and may not need to include every measure presented in this TRM.

The TRM will have a role in program planning. For example, the claimed savings that are used in program planning should match the TRM unless that particular measure is currently being updated. Furthermore, any new prescriptive measure(s) that is proposed in a program plan must be placed into the TRM Update Procedure for inclusion in a subsequent version of the TRM. As a result, the relationship between program planning and the TRM is bidirectional; the TRM is both informed by, and informs, program planning.

## 2.2. Evaluation & Savings Verification

Evaluations may inquire into any of the processes, specifications or components of a measure or the programs that are delivering it. Evaluation results are considered the most accurate source of information available in the context of prescriptive savings calculations and are the preferred source of information during the TRM Update Procedure.

Evaluation results may be applied either retrospectively or prospectively, depending on the preferences and policies established by the ICC. When being applied prospectively, evaluation results should be processed through the TRM Update Procedure and the collaborative SAG process. When being applied retrospectively, evaluation results can be adopted instantaneously into the TRM either by consensus or through an ICC Order

Because the application and contents of the TRM are the subject of ongoing, annual evaluations, policies and processes must be established to handle the myriad circumstances that will inevitably arise during the course of implementing and evaluating a measure. ICC Orders and/or an Evaluation Plan can provide a framework to handle specific applications of evaluation data such as how and when evaluation results are used to adjust claimed savings reports and/or the TRM itself.

## 2.3. Evaluation Reports and Errors in the TRM

If an error is found in the TRM in the middle of a program year that results in an unreasonable savings estimate, the utilities' evaluation teams will work together to agree upon a solution that will result in a reasonable savings estimate. The evaluation teams will use this solution to estimate energy savings in the evaluation report, and will also provide sufficient justification for using the solution within the report. To the extent applicable, the evaluation team will also show the energy savings estimates using the original solution for comparison purposes.

In the event that agreement cannot be reached among the evaluation teams on a single solution, then each evaluation team will calculate energy savings within the evaluation reports using the various solutions proposed by all of the IL evaluation teams. The evaluation teams will indicate which solution they ultimately recommend for use in the energy savings estimates and will include sufficient justification for the solution within the evaluation report. The evaluation team must include a discussion of why they believe the solution ultimately recommended provides more reasonable estimates of energy savings in comparison to the solution recommended by the other evaluation teams (i.e., they should point out the flaws in all of the algorithms proposed).

Portfolio administrators should report these errors to the evaluation team and the TRM Administrator as early in



the program cycle as possible. The error will be “officially” fixed during the annual TRM update process and subsequent ICC proceeding.

## 2.4. Using the TRM to Calculate Savings

The TRM is intended to bring a high level of standardization to the measure savings that each Implementer (utilities and DCEO) claim across the state. As long as measure savings are calculated using the algorithms and input values in the TRM, the TRM also reduces the risk of having their program’s claimed savings estimates adjusted during savings verification. For instance, if an implementer is willing to accept more risk by not making use of the TRM, then they may implement prescriptive measures that are different from or do not appear in the TRM. In this event, the implementer would bear an increased risk of retrospective reductions in the claimed savings estimates during savings verification.

To accomplish the goal of statewide standardization, Implementers are ~~strongly encouraged~~ **required** to use the prescriptive savings algorithms and input values that are provided in the TRM, subject to the following ~~three~~ exceptions:<sup>12</sup>

1. ~~The measure savings are being calculated on a custom basis.~~

~~An implementer is free to choose to implement a TRM measure as a custom measure. Just because a measure is prescriptive in the TRM does not mean that an implementer must implement and calculate savings for that measure prescriptively. The utility may choose to implement that measure through its own custom program, calculating savings using actual or on-site parameter values, metering or perhaps even developing a non-standard savings algorithm. For example...~~

2. ~~The measure does not yet exist in the TRM.~~

In this case, the implementer is free to use algorithms and/or input values that do not yet appear in the TRM. The results will be subject to the usual evaluation and ICC review requirements, and the new measure must be submitted to the TRM Update Procedure during the next update cycle.

3. ~~The Implementer decides that it has a strong and documented case for calculating the prescriptive measure savings based on its own prescriptive savings inputs and algorithms.~~

~~For example, the Implementer may have undertaken a new evaluation study that provides a new parameter value that is better supported or more applicable to the local conditions. In this event, the Implementer would report this decision and the results as part of its annual reports to the ICC and submit the change to the TRM Update Procedure during the next update cycle.~~<sup>12</sup>

### 3.

**Comment [r3]:** CUB agrees with the AG’s critique of this exception, namely that custom is by definition only measures that aren’t prescriptive. This exemption would allow program administrators to use the TRM only when it’s advantageous.

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**Comment [r4]:** CUB agrees with the AG that the TAC must agree upon a specific time period by which the utility must propose the addition of new measures to the TRM. CUB also agrees with the AG’s suggested protocol below:

If new measure TRM values are not adopted by the SAG in time, utility should be subject to retroactive EM&V adjustment. If new measure is adopted for inclusion in the TRM mid-year, then the TRM values can be viewed as deemed back to the beginning of program offering.

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**Comment [r5]:** CUB agrees with the AG that this provision is lacking in transparency and circumvents the Commission’s orders that the utilities work through the SAG to develop the TRC. This provision, which grants utilities too much discretion, defeats important aspects of the TRM, including statewide consistency and stakeholder involvement.

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<sup>12</sup> Note that tracking systems may not be able to track both values within the Program Year.