State of Illinois

Energy Efficiency

Technical Reference Manual

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TABLES & FIGURES

Table 1.1: Revision History

#	Document Title	Date	Reviewer	Status
1	Illinois_Statewide_TRM_HIM_1st_Draft_012712.doc	1/27/12	VEIC	Original Draft
2	Illinois_Statewide_TRM_HIM_1st_Draft_012712_Ameren Navigant.doc	2/10/12	Ryan Del Balso, Navigant/Ameren	Reviewed
3	Illinois_Statewide_TRM_HIM_1st_Draft_012712 – comments NICOR.doc	2/15/12	Andrew Kotila, NICOR	Reviewed
4	Illinois_Statewide_TRM_HIM_1st_Draft_012712 – comments AG_OEI.doc	2/16/12	Phil Mosenthal, OEI/AG	Reviewed
5	Illinois_Statewide_TRM_HIM_1st_Draft_012712 Navigant for ComEd Bus Prescriptive.doc	2/17/12	Kevin Grabner, Navigant/ComEd	Reviewed
6	Illinois_Statewide_TRM_HIM_1st_Draft_012712_CFL Navigant for ComEd.doc	2/17/12	Jeremy Eddy, Navigant/ComEd	Reviewed
7	Illinois_Statewide_TRM_HIM_1st_Draft_012712 ComEd comments.doc	2/20/12	Roger Baker, ComEd	Reviewed
8	NRDC Comments on Draft Illinois TRM 2012-02-20.doc	2/20/12	Chris Neme, NRDC	Reviewed
9	GDS Comments on Draft_012712.doc	2/23/12	Travis Hink, GDS/Ameren	Reviewed
10	Illinois_Statewide_TRM_HIM_1st_Draft_012712 Peoples Northshore comments.doc	2/24/12	George Roemer, Peoples Northshore	Reviewed
11	ELPC Comments on Draft High Impact TRM Illinois comments feb 26.doc	2/26/12	Geoff Crandall, ELPC	Reviewed
12	GDS Comments_Updated on Draft_012712.doc	3/2/12	Travis Hink, GDS/Ameren	Reviewed
13	Illinois_Statewide_TRM_HIM_1st_Draft_012712 KK.doc	3/3/12	K. Kansfield, Ameren	Reviewed
14	Illinois_Statewide_TRM_HIM_1st_Draft_012712_ICC Staff initial comments.doc	3/3/12	J. Hinman, ICC Staff	Reviewed
15	TRM_Draft_012712_KEMA comments_03 01 12.doc	3/4/12	KEMA	Reviewed
16	Addendum 0322 – Residential Gas Boiler and Furnace Measures Integrys comments.doc	4/16/12	Integrys	Reviewed
17	Addendum 0322 – Residential Gas Boiler and Furnace Measures_Navigant 2012 0412.doc	4/12/12	Navigant	Reviewed
18	Addendum 0403 – Commercial Gas Boiler and Furnace Measures Integrys comments.doc	4/16/12	Integrys	Reviewed
19	Addendum 0403 – Commercial Gas Boiler and Furnace Measures-Navigant 2012 0412.doc	4/12/12	Navigant	Reviewed
20	Addendum 0403 – Commercial Gas Boiler and Furnace Measures Nicor comments.doc	4/13/12	Nicor	Reviewed
21	Consolidated Commends from ComEd.doc	4/13/12	KEMA for ComEd	Reviewed
22	Illinois_Statewide_TRM_Comprehensive_Draft_031612 – comments AG_OEI.doc	4/16/12	AG	Reviewed
23	Illinois_Statewide_TRM_Comprehensive_Draft_031612 – Nicor comments.doc	4/13/12	Nicor	Reviewed
24	Illinois_Statewide_TRM_Comprehensive_Draft_031612 Integrys comments.doc	4/16/12	Integrys	Reviewed
25	Illinois_Statewide_TRM_Comprehensive_Draft_031612_BRANDT.doc	4/13/12	ComEd	Reviewed
26	Illinois_Statewide_TRM_Comprehensive_Draft_031612 – comments_Itron Comments for ComEd EMV.doc	4/12/12	ComEd	Reviewed
27	Illinois_Statewide_TRM_Comprehensive_Draft_031612_Jeremy Eddy ComEd WMV.doc	4/11/12	ComEd	Reviewed

#	Document Title	Date	Reviewer	Status
28	Illinois_Statewide_TRM_Comprehensive_Draft_031612_Jeremy.doc	4/11/12	Navigant	Reviewed
29	Illinois_Statewide_TRM_Comprehensive_Draft_031612_Navigant_2012_0413.doc	4/14/12	Navigant	Reviewed
30	JE feedback on comment threads in Res HIM Measure Tracking.doc	4/11/12	Navigant	Reviewed
31	Navigant Additional supporting docs for Residential Clothes washers.doc	4/12/12	Navigant	Reviewed
32	Navigant Analysis of ComEd Lighting EFLH from EMV 2012-04-04.doc	4/4/12	ComEd	Reviewed
33	KEMA TRM v2 Review 4/2/12.xls	4/13/12	ComEd	Reviewed
34	Navigant Supporting Calculations for Res Clothers Wathers 04-08-12.xls	4/12/12	Navigant	Reviewed
35	PY2 kWh by Facility TRM Comparison kb.xls	4/13/12	ComEd	Reviewed
36	TRM Application Issue Tracking Ameren ComEd MidAmerican_041212_Mtg.xls	4/12/12	Various	Reviewed

1 Purpose of the TRM

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 generated by ~~through the State of~~ Illinois~~'~~ energy efficiency programs[1]. 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 ~~Program Administrators~~utilities[2] to prepare this TRM for statewide use.

Comment [TW1]: I've eliminated the term "claim" throughout. This seems to be a VT-specific term without meaning in IL.

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 Program Administrators, stakeholders, Program Administrators, 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.

Comment [TW2]: looks like a typo with PAs listed twice

- 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. [3]"

- "…support coincident peak capacity (for electric) savings estimates and calculations for electric Program Administrators in a manner consistent with the methodologies employed by the Program Administrator's Regional Transmission Organization ("RTO"), as well as those necessary for statewide Illinois tracking of coincident peak capacity impacts."[4]

- Provide a standardized, statewide methodology for calculating prescriptive energy and capacity savings, which gives independent evaluators a consistent framework from which to evaluate the savings achieved for the Illinois energy efficiency portfolios.

1 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)
2 In addition to DCEO, the utilities include; Ameren Illinois, ComEd, Peoples Gas, Peoples North Shore and NICOR.
3 Illinois Statewide Technical Reference Manual Request for Proposals, August 22nd, 2011, pages 3-4, "TRM_RFP_Final_part_1.230214520.pdf"
4 Ibid.

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 models 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[7] (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[8].

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~~calculate savings ~~claim~~ for a discrete case.

Finally, the measure titles used in this TRM may not match exactly the titles that Program Administrator 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.

2 Using the TRM

For each measure characterization, this TRM includes engineering algorithm(s) and a value(s) for each parameter in the equations[5]. 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*[6] 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.

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.

[5] As noted in the RFP, the net-to-gross ratios are provided by the utilities and are listed in the appendices.
[6] 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.

2.1 Organizational Structure

The organization of this document follows a three-level format, each level of which is a major heading in the Table of Contents. These levels are designed to define and clarify what the measure is and where it is applied.

1. **Market Sectors**[7]
   - This level of organization specifies the type of customer the measure applies to, either Commercial or Non-Commercial.
   - Answers the question, "What category best describes the customer?"

2. **End Use Category**
   - This level of organization represents most of the major end use categories for which an efficient alternative exists. The following table lists all of the end use categories in this version of the TRM.
   - Answers the question, "To what end use category does the measure apply?"

Table 2.1: End-Use Categories in the TRM[8]

Non-Commercial Market Sector	Commercial Market Sector
Appliances	Agricultural Equipment
Consumer Electronics	Food Service Equipment
Hot Water	HVAC
HVAC	Lighting
Lighting	Miscellaneous
Shell	Refrigeration
	Water Heating & Distribution

3. **Measure & Technology**
   - This level of organization represents individual efficient measures such as CFL lighting and LED lighting, both of which are individual technologies within the Lighting end use category.
   - Answers the question, "What technology defines the measure?"

This organizational structure is silent on which fuel the measure is designed to save; electricity or natural gas. By organizing the TRM this way, measures that save on both fuels do not need to be repeated. As a result, the TRM will be easier to use and to maintain.

Comment [TW3]: I know its late in the game, and I'm not sure I care, but is there a good reason that we are not just calling this "Residential"?

[7] Note that the Public Building measures that DCEO administers are not listed as a separate Market Sector. This building type is one of a series of building types that are included in the appropriate measures in the Non-Residential Sector.

[8] Please note that this is not an exhaustive list of end uses.

2.2 Measure Code Specification

In order to uniquely identify each measure in the TRM, abbreviations for the major organizational elements of the TRM have been established. When these abbreviations are combined, a unique, 14-character alphanumeric code is formed that can be used for tracking and evaluating savings ~~claims~~.

Code Structure = Market + End Use Category + Measure & Technology + Baseline Category + Version #

For example, the commercial CFL measure might be coded: "COM.LIGHT.STCFL.0001.V.01"

Table 2.2: Measure Code Specification Key

Market (@@@)	End Use (@@@@@)	Measure (@@@@@)	Measure (###)	Version (V.##)
COM	APPLI	CBOVN	1 - 999	1 - 99
RES	ELECT	FZDOR	1 - 999	1 - 99
	HTWTR	STMCK	1 - 999	1 - 99
	HVAC@	CVOVN	1 - 999	1 - 99
	LIGHT	ESOVN	1 - 999	1 - 99
	SHELL	ESFRY	1 - 999	1 - 99
	AGEQP	ESICE	1 - 999	1 - 99
	FSEQP	SPRAY	1 - 999	1 - 99
	MISC@	CHARB	1 - 999	1 - 99
	REFDG	IROVN	1 - 999	1 - 99
		IRBLR		
		IRUBR		
		VENTC		
		PCOOK		
		RKOVN		
		RECON		
		ACTUN		
		BRTUN		
		BLRCO		
		CUHTR		
		ECHIL		
		ESRAC		
		GREM@		
		HPSYS		
		BOILR		
		FRNCE		
		IRHTR		

~~2.3 Using the TRM to Calculate Savings~~

~~The TRM is intended to bring a high level of standardization to the measure savings that each Program Administrator (Program Administrators and DCEO) claim across the state. As long as measure savings are calculated using the algorithms and input values in the TRM, the TRM reduces the risk of program's claimed savings estimates being adjusted during savings verification. For instance, an Program Administrator may accept more risk by not making use of the TRM, but the Program Administrator would bear an increased risk of retrospective changes in the claimed savings estimates during savings verification.~~

~~To accomplish the goal of statewide standardization, Program Administrators are strongly encouraged to use the prescriptive savings algorithms and input values that are provided in the TRM, subject to the following three exceptions.~~

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

~~An Program Administrator can choose to implement a TRM measure as a custom measure. Just because a measure is in the TRM does not mean that an Program Administrator must calculate savings for that measure prescriptively. The Program Administrator 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.~~

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

~~In this case, the Program Administrator 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 should be submitted to the TRM Update Procedure during the next update cycle.~~

~~3. The Program Administrator 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 Program Administrator 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 Program Administrator would report this decision and the results as part of its annual EM&V report and submit the change to the TRM Update Procedure during the next update cycle[9].~~

~~2.4~~2.3 Program Delivery & Baseline Definitions

The measure characterizations in this TRM are not grouped by program delivery type, which is a common approach in other states. As a result, the measures characterizations provided include information and assumptions to support savings calculations for the range of program delivery options commonly used for the measure. The organizational significance of this approach is that multiple baseline kWh usages, incremental costs, O&M costs, measure lives and in-service rates are included in the measure characterization(s) that are delivered under two or more different program designs. Values appropriate for each given program delivery type will be clearly specified in the algorithms or in look-up tables within the characterization.

Care has been taken to clearly define in the measure's description the types of program delivery that the measure characterization is designed to support. However, while there are no universally accepted definitions for a particular program type, and the description of the program type(s) may differ by measure, program delivery types

[9] ~~Note that tracking systems may not be able to track both values within the Program Year.~~

Comment [TW4]: I have moved the issues addressed in this section to Section 3.4 (The TRM's Relationship to Evaluation). The rest of this section 2 seems to deal more with definitional issues around the TRM, so the calculation issues seem more appropriate in Section 3.

can be generally defined according to the following table. These are the definitions used in the measure descriptions, and, when necessary, individual measure descriptions may further refine and clarify these definitions of program delivery type.

Table 2.3: Program Delivery Types

Program	Attributes
Time of Sale (TOS)	Definition: A program in which the customer is incented to purchase or install higher efficiency equipment than if the program had not existed. This may include retail rebate programs, upstream buydown programs, contractor based programs, or CFL giveaways as examples. Baseline = New Equipment Efficient Case = New premium efficiency equipment Example: CFL rebate
New Construction (NC)	Definition: A program that intervenes during building design to support the use of more-efficient equipment and construction practices. Baseline = Building code or federal standards. Efficient Case = The program's level of building specification Example: Building shell and mechanical measures
Retrofit (RF)	Definition: A program that *upgrades* existing equipment before the end of its useful life. Baseline = Existing Equipment or the existing condition of the building or equipment. A single baseline applies over the measure's life. Efficient Case = New, premium efficiency equipment Example: Air sealing. Insulation.
Early Replacement (EREP)	Definition: A program that *replaces* existing equipment before the end of its expected life. Baseline = Dual; it begins as the existing equipment and shifts to new baseline equipment after the expected life of the existing equipment is over. Efficient Case = New, premium efficiency equipment Example: New, replacement appliances
Early Retirement (ERET)	Definition: A program that *retires* duplicative equipment before its expected life is over. Baseline = The existing equipment, which is retired and not replaced. Efficient Case = Zero because the unit is retired. Example: Appliance recycling
Direct Install (DI)	Definition: A program where measures are installed during a site visit. Baseline = Existing Equipment Efficient Case = New, premium efficiency equipment Example: Lighting and low-flow hot water measures

The concept and definition of the baseline is a key element of every measure characterization and is directly related to the program delivery type. Without a clear definition of the baseline, the savings algorithms cannot be adequately specified and subsequent evaluation efforts would be hampered. As a result, each measure has a detailed description (and in many cases, specification) of the specific baseline that should be used to calculate savings. Baselines in this TRM fall into one of the following five categories, and are organized within each measure characterization by the program delivery type to which it applies.

1. **Building Code:** As defined by the minimum specifications required under state energy code or applicable federal standards.

2. **Existing Equipment**: As determined by the most representative (or average) example of equipment that is in the existing stock. Existing equipment baselines apply over the equipment's remaining useful life.

3. **New Equipment**: As determined by the equipment that represents standard practice in the current market environment. New equipment baselines apply over the effective useful life of the measure.

4. **Dual Baseline**: A baseline that begins as the Existing Equipment and shifts to New Equipment after the expected life of the existing equipment is over.

5. **Zero Baseline**: A baseline that is applicable to early retirement measures where the existing equipment is no longer in service.

~~2.5~~2.4 Parameter Input Tables

Many of the measures in this TRM require the user to select the appropriate input value from a list of inputs for a given parameter in the savings algorithm. Where the TRM asks the user to select the input, look-up tables of allowable values are provided. For example, a set of input parameters may depend on building type; while a range of values may be given for each parameter, only one value is appropriate for any specific building type. If no table of alternative inputs is provided for a particular parameter, then the single deemed value will be used, unless the entire measure is implemented on a custom basis. In any case, if site-specific information is available, it is permissible to use it in the algorithm subject to the principle of consistency. If site-specific information is not commonly available, then the deemed (or look-up) value is more appropriate.

~~2.6~~2.5 High Impact Measures

The measures that are expected to collectively account for at least 80% of statewide energy savings are considered high impact measures. The following tables list these measures by market sector and show the section in which they may be found.

Table 2.4: Commercial High Impact Measures

Section	End Use	Technology / Measure
5.1.3	Food Service	Commercial Steam Cooker
5.1.8	Food Service	High Efficiency Pre-Rinse Spray Valve
5.2.2	HVAC	Boiler Tune-up
5.2.3	HVAC	Boiler Lockout/Reset Controls
5.2.9	HVAC	High Efficiency Boilers
5.2.10	HVAC	High Efficiency Furnace
5.2.14	HVAC	Steam Trap Replacement or Repair
5.2.15	HVAC	Variable Speed Drives for HVAC
5.4.1	Lighting	CFL
5.4.2	Lighting	ILED
5.4.3	Lighting	High Performance T8 Fixtures and Lamps
5.4.4	Lighting	T5
5.4.5	Lighting	Lighting Controls
5.5.6	Lighting	Lighting Power Density Reduction
5.4.7	Lighting	LED Traffic and Pedestrian Signals
5.7.6	Hot Water	Tankless Water Heater

Table 2.5: Non-Commercial (Residential) High Impact Measures

Section	End Use	Technology / Measure
6.1.2	Appliances	Clothes Washer
6.1.8	Appliances	Refrigerator & Freezer Recy.
6.3.2	Hot Water	High Efficiency Water Heater
6.3.3	Hot Water	Heat Pump Water Heater
6.3.4	Hot Water	Faucet Aerator
6.3.5	Hot Water	Low Flow Showerhead
6.4.1	HVAC	Air Source Heat Pump
6.4.2	HVAC	Central Air Conditioning
6.4.4	HVAC	Furnace Blower Motor
6.4.5	HVAC	High Efficiency Boiler
6.4.6	HVAC	High Efficiency Furnace
6.4.10	HVAC	Programmable Thermostat
6.5.1	Lighting	Standard CFL
6.5.2	Lighting	Specialty CFL
6.5.5	Lighting	LED
6.6.1	Shell	Air Sealing
6.6.4	Shell	Wall and Ceiling Insulation
6.6.2	Shell	Basement Sidewall Insulation

3 ~~The TRM's Relationship to Existing Processes and Stakeholders~~ Policies for Applying the TRM to Illinois Energy Efficiency Programs

This section defines the policies various stakeholders will follow to apply the TRM in the implementation, evaluation, and planning of Illinois Energy Efficiency programs. ~~Because this is the first statewide TRM, its relationship to existing processes is not yet clearly defined, nor is the role of each stakeholder in the SAG completely known. This section outlines what processes the TRM impacts and how it is expected to relate to those processes. It also outlines the roles and responsibilities that each stakeholder holds in the context of these interrelated processes.~~

3.1 Enabling ICC Policy

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.

The ComEd Commission Finding states "We agree that a TRM can provide substantial benefits to the EEP going forward, and the Commission directs that ComEd 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 in the 10-0570 60 future."

Finally, the Commission ~~also~~ directed Nicor Gas and Integrys to coordinate with other utilities and stakeholders in the TRM process. In the Nicor Gas Order (docket 10-0562), the Commission requires the utility to "participate in the statewide TRM development." In the Integrys finding, the Commission ~~finding~~ state~~s~~, ~~"~~"Also consistent with our rulings in other recent dockets, the Commission agrees that the development of a TRM will be valuable. We direct the Utilities to coordinate with other utilities, DCEO and SAG participants to develop a statewide manual." (Need Integrys docket #.)

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Comment [TW5]: I don't see this language in the Nicor order,

3.1.1 Filing the TRM with the ICC

None of the Orders state a requirement for the Commission to approve the TRM. As a result, the TRM ~~is expected to~~ will be filed with the ICC as a joint, informational filing on the part of the Program Administrators prior to the beginning of each Program Year (PY).

Comment [TW6]: We need to make a choice on language throughout. We have agreed that the policy statements will be codified in the TRM itself, rather than the stipulation agreement. So we can't say things like "is expected to."

3.1.2 Program Administrator Discretion with respect to the TRM

Consistent with Commission policy, the Program Administrators ~~and DCEO~~ have the flexibility to add, change or retire measures from their programs unilaterally as markets, technology and evaluation results change. Therefore, Program Administrators are free to implement measures not included in the TRM; similarly, Program Administrators are not required to implement every measure included in the TRM.

This does not mean that a Program Administrator may make unilateral changes to the TRM itself, however. Only the TRM Administrator, working through the SAG, can make ~~a~~ change~~s~~ to the TRM.

3.1.3 SAG Consensus on TRM Development

Each Utility's Order enables it to implement energy efficiency programs and also provides guidance concerning the TRM. Generally speaking, these Orders describe the TRM's creation and maintenance as being a collaborative process between the Utilities (who in this context are also efficiency Program Administrators[10]) and the SAG.

As a result and as a document that applies statewide, the TRM has been and will continue to be developed through a collaborative consensus using the SAG process[11]. As consensus develops, the TRM Administrator will include the changes in the next version of the TRM[12]. In cases where consensus does not emerge out of the SAG process, the Program Administrators may proceed with their program and measure implementation consistent with section 3.1.2.

3.2 Stakeholder Roles and Responsibilities

Each stakeholder in the SAG has a role to play in the ongoing TRM development process, and these ~~roles~~ are categorized 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 Program Administrators' energy efficiency portfolios. ~~The~~ Evaluators~~-~~ may also make recommendations for TRM improvements and ~~changes that support this responsibility. The Evaluator~~ conduct~~s~~ primary research to help improve ~~the reliability and credibility of the~~ TRM values. Evaluators will ~~and~~ collaborate~~s~~ with ~~the~~ Program Administrators prior to the start of each program year to ~~determine an appropriate balance of~~ define data collection ~~in the upcoming program year~~ needed to support ~~these evaluations~~ TRM application, while minimizing unnecessary administrative cost and burden on Program Administrators, Evaluators and customers.

2. **ICC Staff** – Whose primary responsibility is to make recommendations to the Commission, participate in the development in the annual TRM compliance filing and participate in the SAG's TRM Technical Advisory Committee.

3. **Illinois Commerce Commission** (ICC or Commission or Regulator) – Who receives the TRM annually as a joint informational filing from the Program Administrators, and may at its own discretion, approve, modify, or deny proposed input or algorithmic changes to the TRM.

4. **Program Administrator** (~~Program Administrators~~ Utilities and DCEO) – Whose primary responsibility is to cost effectively meet the energy savings targets set by the Commission by implementing programs, tracking and reporting savings, estimating cost effectiveness and implementing the TRM through its tracking system. The Program Administrators are also key stakeholders in the SAG and TAG processes ~~who also are expected to~~ that will make recommendations for TRM Updates. As authorized by ICC orders approving Energy Efficiency Plans, the Program Administrators have flexibility to add, change, and retire measures, regardless of whether or not measures are included in the TRM.

[10] Note that DCEO is also a Program Administrator who was enabled to operate programs by the ICC.

[11]

12 The TRM Administrator's role has not been firmly established, but has been implied by the ICC staff's comments.

5. **TRM Administrator** (Independent Consultant) – Whose primary responsibility is to manage changes to the TRM document, facilitate the TRM Technical Advisory Committee (TAC), and serve as an independent technical resource. The TRM Administrator updates the TRM each year to reflect Commission Orders and SAG input 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 Program Administrators~~, portfolio administrators, program Program Administrators, evaluators,~~ and other stakeholders.

7. **Other Stakeholders –** Who may participate in the SAG or TAC as directed by the Program Administrators.

~~3.2.1 Stakeholder Roles in the context of Updating the TRM~~

~~The TRM will need to be updated to reflect ongoing changes in Illinois' energy efficiency market; specifically, whenever a new measure or technology is being proposed and anytime an existing measure changes or is retired. 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 3.16: Specific Responsibilities of Each Stakeholder in the TRM Update Procedure

Role	Change Existing Measure (1)[13]	Create New Measures (2)
Evaluator (Consultant)	• Provides rigorous reviews of savings algorithms, inputs and program designs. • Offers a professional opinion on other parties' recommendation. • Reviews and suggests changes to the recommendation. • Identifies and recommends changes as part of the annual evaluations. • Provides recommendations to the TRM Technical Advisory Committee and TRM Administrator. • Identifies and recommends changes based on ongoing reviews of measures and markets. • Coordinates with other Program Administrators' evaluation teams.	• Offers a professional opinion on other parties' recommendations. • Reviews and suggests changes to the recommendation. • Provides recommendations to the TRM Technical Advisory Committee and TRM Administrator. • Coordinates with other Program Administrators' evaluation teams.
ICC (Regulator)	• At its discretion, the ICC may approve, modify or deny requests for TRM input and algorithm assumptions or how the TRM is applied.	• At its discretion, the ICC may approve, modify or deny requests for TRM input and algorithm assumptions or how the TRM is applied.
ICC Staff	• Make recommendations to approve, modify or deny requests for TRM input and algorithm assumptions or how the TRM is applied.	• Make recommendations to approve, modify or deny requests for TRM input and algorithm assumptions or how the TRM is applied.
Program Administrator ~~(Program Administrator)~~	• Updates its tracking systems and modifies its measure calculations, and provides measure update recommendations. • Documents ~~the~~ recommendation, ~~performs~~ analysis and justification ~~work~~. • Provides recommendation in a standardized format agreed to by parties along with supporting workpapers. • Facilitates review process with Evaluator. • Facilitates review process with other Illinois Program Administrators~~/Program Administrators~~ and their evaluation teams.	• Updates its tracking systems and provides new measure recommendations. • 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. • Facilitates review process with Evaluator. • Facilitates review process with other Illinois Program Administrators~~/Program Administrators~~ and their evaluation teams.

[13] In the event that a measure must be retired, this general category and are not listed separately as a result.

Role	Change Existing Measure (1)[13]	Create New Measures (2)
TRM Administrator (Independent Consultant)	• Manages the TRM. • Facilitates and reviews recommendations from other parties as part of the TRM Technical Advisory Committee forum. • Acts as an independent technical resource to the SAG/TAC.	• Manages the TRM. • Facilitates and reviews recommendations from other parties as part of the TRM Technical Advisory Committee forum. • Acts as an independent technical resource to the SAG/TAC.
TRM Technical Advisory Committee (TAC)	• Provides a forum to facilitate consensus for the recommended changes.	• Provides a forum to facilitate consensus for the new measure.

3.3 The TRM's Relationship to ~~Program~~ Portfolio ~~Planning~~Implementation

Program Administrators will update their tracking systems and other program delivery systems to collect and track appropriate data needed to support TRM application. Program Administrators will collaborate with Evaluators prior to the start of each program year to define data collection to support TRM application, while minimizing unnecessary cost and burden on Program Administrators, Evaluators and customers. ~~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 Administrators 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 the utility provides a description of why they deviate from the TRM or that particular measure is currently being updated. Furthermore, it is recommended that any new prescriptive measure(s) that is (are) proposed in a program plan be submitted 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.~~

3.4 The TRM's Relationship to Portfolio Evaluation

Evaluators will estimate energy and capacity savings for prescriptive measures as the product of participants, net-to-gross ratios, and unit savings.

- Evaluators will verify participants, consistent with approaches defined in Evaluator work plans (which take into consideration input from Program Administrators and the SAG).
- Evaluators will apply net-to-gross ratios consistent with the net-to-gross policies defined in ICC Orders approving Utility Energy Efficiency Plans.
- Evaluators will calculate unit savings for prescriptive measures included in the TRM using appropriate TRM algorithms, deemed values, and default values, using the following approach and schedule:
    - For savings achieved in EPY2/GPY5, Evaluators will apply the initial TRM approved by the ICC;
    - For savings achieved in future PYs, Evaluators will apply the TRM Update finalized by March 31 prior to the start of the PY;
    - For savings achieved in EPY4/GPY1, Evaluators will apply unit savings included in Utilities' approved Energy Efficiency Plans.
- For any measures not included in the TRM, including custom measures, prescriptive measures not yet incorporated into the TRM, and prescriptive measures Program Administrators choose to implement using custom savings calculations, Evaluators will develop appropriate savings calculations, consistent with policy direction provided in ICC Orders. In some cases, these savings calculations may include retrospective savings adjustments.

To the extent allowed within evaluation budget limits defined by 220 ILCS 5/8-103(f)(7) and 220 ILCS 5/8-104(f)(8), Evaluators may also make recommendations to improve the TRM in future TRM updates, using experience gained from applying the TRM in previous evaluations, or information gained from new primary research. Evaluator recommendations for improving the TRM, if approved by the SAG and TRM Administrator, will only be applied prospectively through the TRM update process described in Section 4, and will not be used to retrospectively adjust TRM savings calculations for previous years.

~~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~~

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~~results will be applied prospectively, in accordance with the policies established by the ICC[14]. 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 incorporated into the TRM during the current Program Year either by consensus or through an ICC Order.~~

~~Because the application and contents of the TRM are the subject of ongoing, annual evaluations, polices 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.~~

3.4.1 ~~Evaluation Reports and Errors~~ TRM Mistakes ~~in the TRM (Substantial Edit Still Needed)~~

If ~~an error, omission, or assumption which differs significantly from actual program findings~~ a significant mistake is found in the TRM ~~in the middle of a program year~~ that results in an unreasonable savings estimate, the ~~utilities~~ Program Administrator, Evaluator, TRM Administrator, and SAG will ~~and their evaluation teams should work together to agree upon~~ strive to reach consensus on a solution that will result in a reasonable savings estimate. In only these limited cases where there is consensus that the TRM contains a significant mistake will TRM updates occur within a program year and outside of the TRM update schedule defined in Section 4. In these limited cases, Evaluators will use corrected TRM algorithms to calculate energy and capacity savings. ~~The evaluation teams may use this alternative solution to estimate verified energy savings during the program evaluation. They should provide sufficient justification for using the alternate solution within a memo.~~

~~In the event that agreement cannot be reached among the parties on a single solution, 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 through a measure update memo. The evaluation team should 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) and the TRM.~~

3.5 The TRM's Relationship to Portfolio Planning

To estimate prescriptive measure savings and cost-effectiveness in the 3-year Energy Efficiency Plans required by 220 ILCS 5/8-103 and 220 ILCS 5/8-104, Program Administrators will apply the TRM algorithms finalized by the March 1 prior to the Energy Efficiency Plan filings, Utilities will adjust plan savings goals in final compliance filings to the ICC to reflect changes incorporated into the TRM update finalized by the March 31 after the Energy Efficiency Plan filing.

While there are no specific requirements for Program Administrators to complete annual or other shorter term plans, since Evaluators will apply TRM algorithms to calculate prescriptive measure savings and cost effectiveness, Program Administrators will benefit from incorporating TRM algorithms into any shorter term plans developed to manage Energy Efficiency portfolios. Program Administrators have the flexibility to adjust program plans to add, change, and retire measures, regardless of whether or not measures are included in the TRM.

Program Administrators adding new prescriptive measures to their portfolios may submit these measures for possible inclusion in future TRM updates. The TRM Administrator and SAG will identify appropriate measures to

Comment [RD7]: Should this be done through SAG?

Comment [KK8]: Seems a bit arduous.

Comment [9]: This is generally unreasonable and does not add value to an evaluation report, but does add cost.

Comment [10]:

Comment [TW11]: I'm not sure that this paragraph is actually needed. It may go without saying. But the previous draft seemed to go here, so I crafted something to address annual planning.

~~[14] Note that custom measure savings claims may be adjusted retrospectively. However, the prescriptive measures savings claims resulting from application of this TRM may only be changed prospectively.~~

include in future TRM Updates, using the process identified in Section 4.

4 TRM Update Process & Timeline

Because technology is constantly improving, a TRM must be a living document ~~that~~ to keep~~s~~ pace ~~with it~~. Otherwise, the TRM will quickly become obsolete and the savings estimates will become inaccurate. The following sections propose a procedure and timeline for updating the TRM that is in sequence with the regulatory milestones that have already been set for future efficiency plan filings.

4.1 The Regulatory Schedule for Energy Efficiency Programs

Because technology and markets are so dynamic, a structured and ongoing update process for the TRM is necessary. Because the update process needs to be aligned with Illinois' existing program planning and implementation cycles, these cycles are summarized in the following two tables.

Table 4.1: Efficiency Plan Periods

Cycle	Plan Filing Date	Electric Plan Approval	Applicable Electric Program Year (PY)	Applicable Gas Program Year[15] (PY)
1	Nov-07	Feb-08	PY1 – PY3	
2	Oct-10	Dec-10	PY4 – PY6	PY1 – PY3
3	Sep-13	Feb-14	PY7 – PY9	PY4 – PY6

[15] Note that there is no statutory deadline for the approval of gas efficiency plans.

Table 4.2: TRM Implementation Cycle[16]

Cycle	EPY	GPY	Begins	Ends	Application in Evaluation	Application in 3-Year Plans
1	1		6/1/08	5/31/09	TRM does not apply to this cycle.	TRM not used in this cycle
	2		6/1/09	5/31/10		
	3		6/1/10	5/31/11		
2	4	1	6/1/11	5/31/12	TRM does not apply to this PY	TRM not used in this cycle
	5	2	6/1/12	5/31/13	TRM finalized by 6/1/12 applies	
	6	3	6/1/13	5/31/14	TRM finalized by 3/1/13 applies	
3	7	4	6/1/14	5/31/15	TRM finalized by 3/1/14 applies	TRM finalized by 3/1/13 used in filing; TRM finalized by 3/1/14 used in compliance filing.
	8	5	6/1/15	5/31/16	TRM finalized by 3/1/15 applies	
	9	6	6/1/2016	5/31/2017	TRM finalized by 3/1/16 applies	

Comment [TW12]: Since redline caused so many formatting issues, I turned it off to update this table to address planning issues outlined in Section 3.5

~~The TRM update procedure occurs continuously throughout any program year.~~ In recognition of portfolio adjustments that need to be made due to TRM ~~results~~updates, TRM ~~results~~ changes that are finalized ~~as of~~ by March 1 of any program year will be applied by Evaluators to calculate savings and cost effectiveness ~~in effect for the evaluation and determination of program year savings~~ for the following program year. As part of the SAG and the SAG technical committee, ICC Staff will also have the opportunity to review the TRM prior to it being in effect for the following program year. Whenever there is dissension regarding the TRM, a party can petition the Commission for a ruling or ask that it be addressed in a docketed proceeding.

Program Administrators will use TRM updates finalized by the March 1 prior to 3-year Energy Efficiency Plan filings to calculate prescriptive measure savings and cost effectiveness in their plan filings, Utilities will adjust plan savings goals and cost-effectiveness results in final compliance filings to the ICC to reflect changes incorporated into the TRM update finalized by the March 31 following the Energy Efficiency Plan filing.

4.2 Update Timeline and Process

The TRM update procedure occurs over the course of one complete implementation cycle which is three years in duration. Because the evaluation and update cycle ~~cannot begin without~~ generally relies on one full prior year of performance data, these activities take place during the second program year in the implementation cycle. This means that the evaluation results from the first program year will be put into effect for the first time at the beginning of the third planning year. However, it should be noted that it is appropriate and expected that any completed evaluation be considered and/or incorporated into the TRM as they become available.

[16] It is assumed the prospective application of the March 1 TRM will occur continuously until policy dictates otherwise. In the spirit of collaboration and support of the TRM process and due to the current 2012 transition process of completing the TRM, there will be an exception to the March 1 dating where TRM results that are finalized as of June 1, 2012 will be in effect for the evaluation of PY5.

Figure 1: Timeline and Milestones of the TRM Update Procedure

Comment [TW13]: Not sure if this needs to be updated for the planning issues.

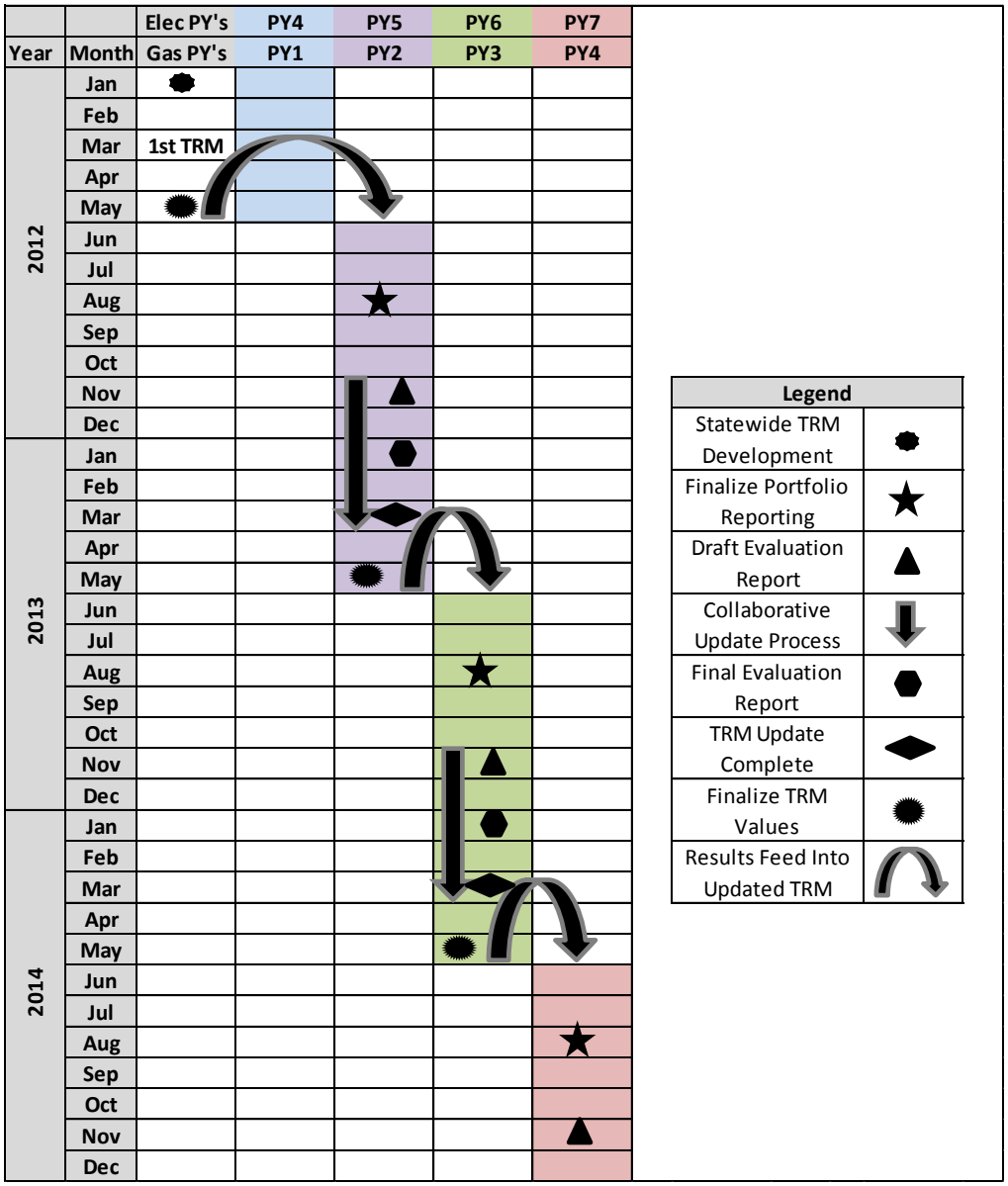
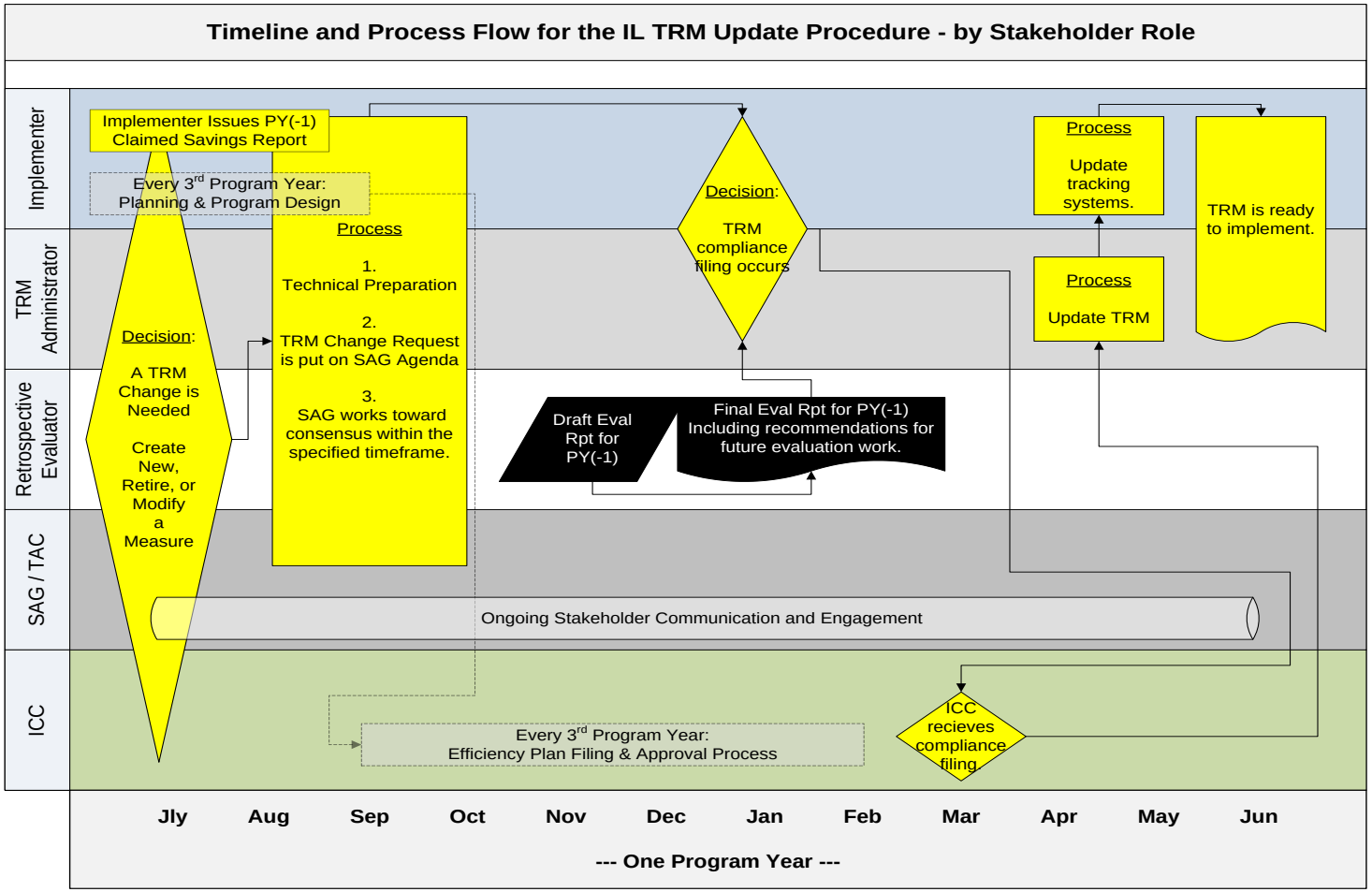


Figure 2: Timeline & Process Flow of the TRM Update Procedure by Stakeholder



5 Assumptions

The information contained in this TRM contains VEIC's recommendations for the content of the first edition of the Illinois TRM, as well as a process for maintaining and updating it over time. Sources that are cited within the TRM have been chosen based on two priorities, geography and age. Whenever possible, VEIC has incorporated Illinois-specific information into each measure characterization. The existing Commercial TRM documents from Ameren and ComEd were reviewed, as well as program and measure specific data from evaluations, efficiency plans and working documents. When Illinois-specific data has not been available, information from neighboring states, the Midwest region, or states with more mature efficiency programs has been used. Finally, the most current sources have been cited whenever possible.

The assumptions for these characterizations rest on our understanding of the information available. In each case, we reviewed the available Illinois and Mid-West-specific information, including evaluations and support material provided by the Illinois Program Administrators.

When Illinois or region-specific evaluations or data were not available, we turned to best practice research and data from other jurisdictions, often from west and east-coast states that have long-standing efficiency programs. These programs have allocated large amounts of funding to evaluation work and to refining their measure characterization parameters. As a result, much of the most-defensible information originates from these regions. In every case we used the most-recent well-designed and supported studies and only if it was appropriate to generalize their conclusions to the Illinois Program Administrators' programs.

The TRM is intended to be a living document. There will be measures that are not characterized here; new measures will be added to programs and new program designs will be implemented; new information will be gathered through evaluations or research; and savings for current measures will change as the activity of the programs changes their markets. For instance, savings for CFLs will decrease over time as successful programs result in lamps being installed mostly in lower-use locations. As assumptions and reference material changes, the TRM update and timeline process allows for ~~frequent~~ review and update of the TRM ~~as needs demand~~on an annual basis.~~.~~ To the extent that Program Administrators implement measures not covered by the TRM, savings and cost-effectiveness of these measures will be assessed by independent Evaluators. ~~Data from reliable impact evaluations would be necessary to support savings claims until the measure has been incorporated into the TRM or updated~~.

5.1 Footnotes & Documentation of Sources

Each measure characterization uses footnotes to document the references that have been used to characterize the technology. The reference documents are too numerous to include in an Appendix and have instead been posted in *.zip files on the TRM Project's Sharepoint website. These zip files can be found in the 'Sources and Reference Documents' folder in the main directory, and will also be posted to the SAG's public web site as well.

5.2 General Assumptions

These savings estimates are expected to serve as representative, recommended value, or ways to calculate savings based on program-specific information. All information is presented on a per-measure basis. In using the measure-specific information in the TRM, it is helpful to keep the following notes in mind.

- All estimates of energy (kWh) and peak (kW) savings are for first-year savings, not lifetime savings.
- Unless otherwise noted, measure life is defined to be the life of an energy consuming measure, including its equipment life and measure persistence.

- Where deemed values for savings are provided, they represent the average energy (kWh or therms) or peak (kW) savings that could be expected from the average of all measures that might be installed in ~~the state~~ Illinois in ~~2012~~PY2.

- In general, the baselines included in the TRM are intended to represent average conditions in Illinois. Some are based on data from the state, such as household consumption characteristics provided by the Energy Information Administration. Some are extrapolated from other areas, when Illinois data are not available.

5.3 Shifting Baseline Assumptions

The TRM anticipates the effects of changes in efficiency codes and standards on affected measures. When these changes take effect, a shift in the baseline is usually called for. This complicates the measure savings estimation somewhat, and will be handled in future versions of the TRM by describing the choice of and reasoning behind a shifting baseline assumption. In this version of the TRM, this applies to CFLs and T12 Linear Fluorescents.

5.3.1 CFL and T12 Linear Florescents

Specific reductions in savings have been incorporated for CFL measures that relate to the shift in appropriate baseline due to changes in Federal Standards for lighting products. Federal legislation (stemming from the Energy Independence and Security Act of 2007) mandates a phase-in process beginning in 2012 for all general-purpose light bulbs between 40 and 100W to be approximately 30% more energy efficient than current incandescent bulbs, in essence beginning the phase-out of the current style, or "standard", incandescent bulbs. In 2012, standard 100W incandescent bulbs will no longer be manufactured, followed by restrictions on standard 75W bulbs in 2013 and 60W and 40W bulbs in 2014. The baseline for the CFL measure in the corresponding program years starting June 1 each year will therefore become bulbs (improved, or "efficient", incandescent, or halogen) that meet the new standard. Those products can take several different forms we can envision now and perhaps others we do not yet know about; halogens are one of those possibilities and have been chosen to represent a baseline at that time. To account for this shifting baseline, annual savings are reduced within the lifetime of the measure. Other lighting measures will also have baseline shifts (for example screw based LED and CFL fixtures) that will result in significant impacts to annual estimated savings in later years. Finally, as of July 14, 2012, Federal standards will require that practically all linear fluorescents meet strict performance requirements essentially requiring all T12 users to upgrade to high performance T8 lamps and ballasts[17]. We have assumed that this standard will become fully effective in 2016. To account for this, we have included a methodology to address the shifting baseline in the high performance T8 measure and T5 measure which is defined specifically in each measure.

[17] At the time of this draft, we understand that some standard T8 lamps may meet the federal standard, and in that event, some T12 retrofits may end up being completed with standard T8s instead of high performance T8s.

5.4 Glossary

Baseline Efficiency: The assumed standard efficiency of equipment, absent an efficiency program.

Building Types[18]:

Building Type	Definition
College/University	Applies to facility space used for higher education. Relevant buildings include administrative headquarters, residence halls, athletic and recreation facilities, laboratories, etc. The total gross floor area should include all supporting functions such as kitchens used by staff, lobbies, atria, conference rooms and auditoria, fitness areas for staff, storage areas, stairways, elevator shafts, etc.
Exterior	Applies to unconditioned spaces that are outside of the building envelope.
Garage	Applies to unconditioned spaces either attached or detached from the primary building envelope that are not used for living space.
Grocery	Applies to facility space used for the retail sale of food and beverage products. It should not be used by restaurants, which are not eligible for a rating at this time. The total gross floor area should include all supporting functions such as kitchens and break rooms used by staff, storage areas (refrigerated and non-refrigerated), administrative areas, stairwells, atria, lobbies, etc.
Heavy Industry	Undefined.
Hotel/Motel	Applies to buildings that rent overnight accommodations on a room/suite basis, typically including a bath/shower and other facilities in guest rooms. The total gross floor area should include all interior space, including guestrooms, halls, lobbies, atria, food preparation and restaurant space, conference and banquet space, health clubs/spas, indoor pool areas, and laundry facilities, as well as all space used for supporting functions such as elevator shafts, stairways, mechanical rooms, storage areas, employee break rooms, back-of-house offices, etc. Hotel does not apply to fractional ownership properties such as condominiums or vacation timeshares. Hotel properties should be owned by a single entity and have rooms available on a nightly basis.
K-12 School	Applies to facility space used as a school building for Kindergarten through 12th grade students. This does not include college or university classroom facilities and laboratories, vocational, technical, or trade schools. The total gross floor area should include all supporting functions such as administrative space, conference rooms, kitchens used by staff, lobbies, cafeterias, gymnasiums, auditoria, laboratory classrooms, portable classrooms, greenhouses, stairways, atria, elevator shafts, small landscaping sheds, storage areas, etc. The K-12 school model does not apply to preschool or day care buildings; in order to classify as K-12 school, more than 75% of the students must be in kindergarten or older.
Light Industry	Undefined.
Medical	Applies to a general medical and surgical hospital (including critical access hospitals and children's hospitals) that is either a stand-alone building or a campus of buildings. The definition of Hospital accounts for all space types that are located within the Hospital building/campus, such as medical offices, administrative offices, and skilled nursing. The total floor area should include the aggregate floor area of all buildings on the campus as well as all supporting functions such as: stairways, connecting corridors between buildings, medical offices, exam rooms, laboratories, lobbies, atria, cafeterias, storage areas, elevator shafts, and any space affiliated with emergency medical care, or diagnostic care.
Miscellaneous	Applies tospaces that do not fit clearly within any available categories should be designated as "miscellaneous".
Multifamily	Applies to residential buildings of three of more units, including all public and multiuse spaces within the building envelope.

[18] Source: US EPA, www.energystar.gov, Space Type Definitions

Building Type	Definition
Office	Applies to facility spaces used for general office, professional, and administrative purposes. The total gross floor area should include all supporting functions such as kitchens used by staff, lobbies, atria, conference rooms and auditoria, fitness areas for staff, storage areas, stairways, elevator shafts, etc.
Restaurant	Applies to a subcategory of Retail/Service space that is used to provide commercial food services to individual customers, and includes kitchen, dining, and common areas.
Retail/Service	Applies to facility space used to conduct the retail sale of consumer product goods. Stores must be at least 5,000 square feet and have an exterior entrance to the public. The total gross floor area should include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, etc. Retail segments typically included under this definition are: Department Stores, Discount Stores, Supercenters, Warehouse Clubs, Drug Stores, Dollar Stores, Home Center/Hardware Stores, and Apparel/Hard Line Specialty Stores (e.g. books, clothing, office products, toys, home goods, electronics). Retail segments excluded under this definition are: Supermarkets (eligible to be benchmarked as Supermarket space), Convenience Stores, Automobile Dealerships, and Restaurants.
Warehouse	Applies to unrefrigerated or refrigerated buildings that are used to store goods, manufactured products, merchandise or raw materials. The total gross floor area of Refrigerated Warehouses should include all temperature controlled area designed to store perishable goods or merchandise under refrigeration at temperatures below 50 degrees Fahrenheit. The total gross floor area of Unrefrigerated Warehouses should include space designed to store non-perishable goods and merchandise. Unrefrigerated warehouses also include distribution centers. The total gross floor area of refrigerated and unrefrigerated warehouses should include all supporting functions such as offices, lobbies, stairways, rest rooms, equipment storage areas, elevator shafts, etc. Existing atriums or areas with high ceilings should only include the base floor area that they occupy. The total gross floor area of refrigerated or unrefrigerated warehouse should not include outside loading bays or docks. Self-storage facilities, or facilities that rent individual storage units, are not eligible for a rating using the warehouse model.

Coincidence Factor (CF): Coincidence factors represent the fraction of connected load expected to be coincident with a particular system peak period, on a diversified basis. Coincidence factors are provided for summer peak periods.

Commercial: The market sector that includes measures that apply to any of the building types defined in this TRM, which includes multifamily common areas and public housing[19].

Connected Load: The maximum wattage of the equipment, under normal operating conditions.

Deemed Value: A value that has been assumed to be representative of the average condition of an input parameter. This term may also refer to the calculated result of a prescriptive savings algorithm.

Default Value: When a measure indicates that an input to a prescriptive saving algorithm may take on a range of values, an average value is also provided in many cases. This value is considered the default input to the algorithm, and should be used when the other alternatives listed in the measure are not applicable.

End Use Category: A general term used to describe the categories of equipment that provide a service to an individual or building. See Table 2.1 for a list of the end use categories that are incorporated in this TRM.

[19] Measures that apply to the multifamily and public housing building types describe how to handle tenant versus master metered buildings.

EM&V – Evaluation, Measurement and Verification. An ongoing annual process that Program Administrators must complete for the ICC.

Evaluation: A backward looking process of determining the appropriate process, algorithm and/or input value for any given measure or measure component. ~~Evaluation results may be applied prospectively or retrospectively in accordance with the approved plans of each utility.~~

Full Load Hours (FLH): The equivalent hours that equipment would need to operate at its peak capacity in order to consume its estimated annual kWh consumption (annual kWh/connected kW).

High Efficiency: General term for technologies and processes that require less energy, water, or other inputs to operate.

Lifetime: The number of years (or hours) that the new high efficiency equipment is expected to function. These are generally based on engineering lives, but sometimes adjusted based on expectations about frequency of removal, remodeling or demolition. Two important distinctions fall under this definition; Effective Useful Life (EUL) and Remaining Useful Life (RUL).

> **EUL** – EUL is based on the manufacturers rating of the effective useful life; how long the equipment will last. For example, a CFL that operates x hours per year will typically have an EUL of y. A house boiler may have a lifetime of 20 years but the EUL is only 15 years since after that time it may be operating at a non-efficient point.
>
> **RUL** – Applies to retrofit or replacement measures. For example, if an existing working refrigerator is replaced with a high efficiency unit, the RUL is an assumption of how many more years the existing unit would have lasted. As a general rule the RUL is usually assumed to be 1/3 of the EUL.

Load Factor (LF): The fraction of full load (wattage) for which the equipment is typically run.

Measure Cost: The incremental (for time of sale measures) or full cost (both capital and labor for retrofit measures) of implementing the High Efficiency equipment.

Measure Description: A detailed description of the technology, the criteria it must meet to be eligible for an incentive and the program(s) that delivers it.

Measure Type: Measures are categorized into two subcategories; prescriptive and custom.

> **Custom:** Measure uses ~~claimed~~ savings algorithm and/or inputs, or metering results that apply only to the individual customer who is implementing them.
>
> **Prescriptive:** Measures whose ~~claimed~~ savings algorithm and inputs are fixed within the TRM and may not be changed by the Program Administrator. Prescriptive measures make up most of the measure in the Residential market sector. Two subcategories of prescriptive measures include:
>
> > **Fully Deemed:** A measure whose inputs are completely specified and are not subject to change or choice on the part of the Program Administrator.
> >
> > **Partially Deemed:** A measure whose inputs may be selected to some degree by the Program Administrator.

Measure: An efficient technology or procedure that results in energy savings as compared to the baseline efficiency.

~~Non-Commercial~~Residential**:** The market sector that includes measures that apply only to detached, residential buildings or duplexes.

Operation and Maintenance (O&M) Cost Adjustments: The dollar impact resulting from differences between baseline and efficient case Operation and Maintenance costs.

Operating Hours (HOURS): The annual hours that equipment is expected to operate.

Program: The mode of delivering a particular measure or set of measures to customers. See Table 2.2 for a list of program descriptions that are presently operating in Illinois.

Rating Period Factor (RPF): Percentages for defined times of the year that describe when energy savings will be realized for a specific measure.

~~**Savings Verification**: The annual process that verifies that the TRM has been applied correctly and consistently during the previous program year. This process results in a realization rate, which may adjust the claimed savings of an entire program retroactively. Savings verification often results in recommendations for further evaluation and/or field (metering) studies to increase the accuracy of the claimed savings estimate going forward.~~

Stakeholder Advisory Group (SAG): A group of stakeholders who have an interest in Illinois' energy efficiency programs and who meet regularly to share information and work toward consensus on various energy efficiency issues. The Program Administrators in Illinois have been directed by the Illinois Commerce Commission (ICC) to work with the SAG on the development of a statewide TRM. A list of current SAG members appears in the following table.

Table 5.1: SAG Stakeholder List

SAG Stakeholder
Ameren Illinois
Center for Neighborhood Technology (CNT)
Citizen's Program Administrator Board (CUB)
City of Chicago
Commonwealth Edison (ComEd)
Environment IL
Environmental Law and Policy Center (ELPC)
Future Energy Enterprises LLC
Illinois Commerce Commission Staff (ICC Staff)
Illinois Department of Commerce and Economic Opportunity (DCEO)
Illinois Attorney General's Office (AG)
Integrys (Peoples Gas and North Shore Gas)
Metropolitan Mayor's Caucus (MMC)
Midwest Energy Efficiency Association (MEEA)
National Resources Defense Council (NRDC)
Nicor Gas
Shaw Environmental
University of Illinois, Chicago

5.5 Electrical Loadshapes (kWh)

Loadshapes are an integral part of the measure characterization and are used to divide energy savings in to appropriate periods using Rating Period Factors that each have variable avoided cost values allocated to them.

For the purposes of assigning energy savings (kWh) periods, the Technical Subcommittee has agreed to use the industry standards for wholesale power market transactions as shown in the following table.

Table 2.4: On and Off Peak Energy Definitions

Period Category	Period Definition (Central Prevailing Time)
Winter On-Peak Energy	8AM - 11PM, weekday, Oct - Apr, No NERC holidays
Winter Off-Peak Energy	All other hours
Summer On-Peak Energy	8AM - 11PM, weekdays, May – Sept, No NERC holidays
Summer Off-Peak Energy	All other hours

Loadshapes have been developed for each end use by assigning Rating Period Factor percentages to each of the four periods above. Two methodologies were used:

1. Itron eShapes[20] data for Missouri, reconciled to Illinois loads and provided by Ameren, were used to calculate the percentage of load in to the four categories above.

2. Where the Itron eShapes data did not provide a particular end use or specific measure load profile, loadshapes that have been developed over many years by Efficiency Vermont and that have been reviewed by the Vermont Department of Public Service, were adjusted to match Illinois period definitions. Note – no weather sensitive loadshapes were based on this method. Any of these load profiles that relate to High Impact Measures should be an area of future evaluation.

The following pages provide the loadshape values for all measures provided in the Technical Reference Manual. To distinguish the source of the loadshape, they are color coded. Rows that are shaded in green are Efficiency Vermont loadshapes adjusted for Illinois periods. Rows that are unshaded and are left in white are Itron eShapes data provided by Ameren.

A number of Program Administrators use the DSMore tool to screen the efficiency measures and since this tool requires a loadshape value for weekdays and weekends in each month (i.e. 24 inputs), the percentages for the four period categories above were calculated by weighting the proportion of weekdays/weekends in each month to the total within each period. The results of these calculations are also provided below.

[20] All loadshape information has been posted to the project's Sharepoint site, and may be provided publically through the Stakeholder Advisory Group's web site at their discretion.

Table 5.2: Loadshapes by Season

		Winter Peak	Winter Off-peak	Summer Peak	Summer Off-peak
	Loadshape Reference Number	Oct-Apr, M-F, non-holiday, 8AM - 11PM	Oct-Apr, All other time	May- Sept, M-F, non-holiday, 8AM - 11PM	May - Sept, All other time
Residential Clothes Washer	R01	47.0%	11.1%	34.0%	8.0%
Residential Dish Washer	R02	49.3%	8.7%	35.7%	6.3%
Residential Electric DHW	R03	43.2%	20.6%	24.5%	11.7%
Residential Freezer	R04	38.9%	16.4%	31.5%	13.2%
Residential Refrigerator	R05	37.0%	18.1%	30.1%	14.7%
Residential Indoor Lighting	R06	48.1%	15.5%	26.0%	10.5%
Residential Outdoor Lighting	R07	18.0%	44.1%	9.4%	28.4%
Residential Cooling	R08	4.1%	0.7%	71.3%	23.9%
Residential Electric Space Heat	R09	57.8%	38.8%	1.7%	1.7%
Residential Electric Heating and Cooling	R10	35.2%	22.8%	31.0%	11.0%
Residential Ventilation	R11	25.8%	32.3%	18.9%	23.0%
Residential - Dehumidifier	R12	12.9%	16.2%	31.7%	39.2%
Residential Standby Losses - Entertainment Center	R13	26.0%	32.5%	18.9%	22.6%
Residential Standby Losses - Home Office	R14	23.9%	34.6%	17.0%	24.5%
Commercial Electric Cooking	C01	40.6%	18.2%	28.7%	12.6%
Commercial Electric DHW	C02	40.5%	18.2%	28.5%	12.8%
Commercial Cooling	C03	4.9%	0.8%	66.4%	27.9%
Commercial Electric Heating	C04	53.5%	43.2%	1.9%	1.4%
Commercial Electric Heating and Cooling	C05	19.4%	13.5%	47.1%	19.9%
Commercial Indoor Lighting	C06	40.1%	18.6%	28.4%	12.9%
Grocery/Conv. Store Indoor Lighting	C07	31.4%	26.4%	22.8%	19.3%
Hospital Indoor Lighting	C08	29.1%	29.0%	21.0%	20.9%
Office Indoor Lighting	C09	42.1%	16.0%	30.4%	11.5%

		Winter Peak	Winter Off-peak	Summer Peak	Summer Off-peak
	Loadshape Reference Number	Oct-Apr, M-F, non-holiday, 8AM - 11PM	Oct-Apr, All other time	May- Sept, M-F, non-holiday, 8AM - 11PM	May - Sept, All other time
Restaurant Indoor Lighting	C10	32.1%	25.7%	23.4%	18.8%
Retail Indoor Lighting	C11	35.5%	22.3%	25.8%	16.3%
Warehouse Indoor Lighting	C12	39.4%	18.5%	28.6%	13.5%
K-12 School Indoor Lighting	C13	45.8%	22.6%	20.2%	11.4%
Indust. 1-shift (8/5) (e.g., comp. air, lights)	C14	50.5%	7.2%	37.0%	5.3%
Indust. 2-shift (16/5) (e.g., comp. air, lights)	C15	47.5%	10.2%	34.8%	7.4%
Indust. 3-shift (24/5) (e.g., comp. air, lights)	C16	34.8%	23.2%	25.5%	16.6%
Indust. 4-shift (24/7) (e.g., comp. air, lights)	C17	25.8%	32.3%	18.9%	23.0%
Industrial Indoor Lighting	C18	44.3%	13.6%	32.4%	9.8%
Industrial Outdoor Lighting	C19	18.0%	44.1%	9.4%	28.4%
Commercial Outdoor Lighting	C20	23.4%	35.3%	13.0%	28.3%
Commercial Office Equipment	C21	37.7%	20.9%	26.7%	14.7%
Commercial Refrigeration	C22	38.5%	20.6%	26.7%	14.2%
Commercial Ventilation	C23	38.1%	20.6%	29.7%	11.6%
Traffic Signal - Red Balls, always changing or flashing	C24	25.8%	32.3%	18.9%	23.0%
Traffic Signal - Red Balls, changing day, off night	C25	37.0%	20.9%	27.1%	14.9%
Traffic Signal - Green Balls, always changing	C26	25.8%	32.3%	18.9%	23.0%
Traffic Signal - Green Balls, changing day, off night	C27	37.0%	20.9%	27.1%	14.9%
Traffic Signal - Red Arrows	C28	25.8%	32.3%	18.9%	23.0%
Traffic Signal - Green Arrows	C29	25.8%	32.3%	18.9%	23.0%
Traffic Signal - Flashing Yellows	C30	25.8%	32.3%	18.9%	23.0%
Traffic Signal - “Hand” Don’t Walk Signal	C31	25.8%	32.3%	18.9%	23.0%
Traffic Signal - “Man” Walk Signal	C32	25.8%	32.3%	18.9%	23.0%
Traffic Signal - Bi-Modal Walk/Don’t Walk	C33	25.8%	32.3%	18.9%	23.0%
Industrial Motor	C34	47.5%	10.2%	34.8%	7.4%
Industrial Process	C35	47.5%	10.2%	34.8%	7.4%

		Winter Peak	Winter Off-peak	Summer Peak	Summer Off-peak
	Loadshape Reference Number	Oct-Apr, M-F, non-holiday, 8AM - 11PM	Oct-Apr, All other time	May- Sept, M-F, non-holiday, 8AM - 11PM	May - Sept, All other time
HVAC Pump Motor (heating)	C36	38.7%	48.6%	5.9%	6.8%
HVAC Pump Motor (cooling)	C37	7.8%	9.8%	36.8%	45.6%
HVAC Pump Motor (unknown use)	C38	23.2%	29.2%	21.4%	26.2%
VFD - Supply fans <10 HP	C39	38.8%	16.1%	28.4%	16.7%
VFD - Return fans <10 HP	C40	38.8%	16.1%	28.4%	16.7%
VFD - Exhaust fans <10 HP	C41	34.8%	23.2%	20.3%	21.7%
VFD - Boiler feedwater pumps <10 HP	C42	42.9%	44.2%	6.6%	6.3%
VFD - Chilled water pumps <10 HP	C43	11.2%	5.5%	40.7%	42.6%
VFD Boiler circulation pumps <10 HP	C44	42.9%	44.2%	6.6%	6.3%
Refrigeration Economizer	C45	36.3%	50.8%	5.6%	7.3%
Evaporator Fan Control	C46	24.0%	35.9%	16.7%	23.4%
Standby Losses - Commercial Office	C47	8.2%	50.5%	5.6%	35.7%
VFD Boiler draft fans <10 HP	C48	37.3%	48.9%	6.4%	7.3%
VFD Cooling Tower Fans <10 HP	C49	7.9%	5.2%	54.0%	32.9%
Engine Block Heater Timer	C50	26.5%	61.0%	4.1%	8.5%
Door Heater Control	C51	30.4%	69.6%	0.0%	0.0%
Beverage and Snack Machine Controls	C52	10.0%	48.3%	7.4%	34.3%
Flat	C53	36.3%	21.8%	26.2%	15.7%

Table 5.3: Loadshapes by Month and Day of Week

		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
		M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S
Residential Clothes Washer	R01	6.8%	1.7%	6.5%	1.5%	6.8%	1.5%	6.5%	1.7%	7.2%	1.5%	6.5%	1.5%	6.9%	1.7%	7.2%	1.5%	6.2%	1.9%	7.1%	1.5%	6.8%	1.5%	6.5%	1.8%
Residential Dish Washer	R02	7.1%	1.3%	6.8%	1.2%	7.1%	1.2%	6.8%	1.3%	7.5%	1.2%	6.9%	1.2%	7.2%	1.3%	7.5%	1.2%	6.5%	1.5%	7.5%	1.2%	7.1%	1.2%	6.8%	1.5%
Residential Electric DHW	R03	6.2%	3.1%	6.0%	2.8%	6.2%	2.8%	6.0%	3.1%	5.2%	2.2%	4.7%	2.2%	5.0%	2.4%	5.2%	2.2%	4.5%	2.7%	6.5%	2.8%	6.2%	2.8%	6.0%	3.4%
Residential Freezer	R04	5.6%	2.5%	5.4%	2.2%	5.6%	2.2%	5.4%	2.5%	6.6%	2.5%	6.1%	2.5%	6.4%	2.8%	6.6%	2.5%	5.8%	3.1%	5.9%	2.2%	5.6%	2.2%	5.4%	2.7%
Residential Refrigerator	R05	5.4%	2.7%	5.1%	2.4%	5.4%	2.4%	5.1%	2.7%	6.4%	2.7%	5.8%	2.7%	6.1%	3.1%	6.4%	2.7%	5.5%	3.4%	5.6%	2.4%	5.4%	2.4%	5.1%	3.0%
Residential Indoor Lighting	R06	7.0%	2.3%	6.6%	2.1%	7.0%	2.1%	6.6%	2.3%	5.5%	2.0%	5.0%	2.0%	5.2%	2.2%	5.5%	2.0%	4.8%	2.4%	7.3%	2.1%	7.0%	2.1%	6.6%	2.6%
Residential Outdoor Lighting	R07	2.6%	6.6%	2.5%	5.9%	2.6%	5.9%	2.5%	6.6%	2.0%	5.3%	1.8%	5.3%	1.9%	6.0%	2.0%	5.3%	1.7%	6.6%	2.7%	5.9%	2.6%	5.9%	2.5%	7.4%
Residential Cooling	R08	0.6%	0.1%	0.6%	0.1%	0.6%	0.1%	0.6%	0.1%	15.1%	4.4%	13.7%	4.4%	14.4%	5.0%	15.1%	4.4%	13.1%	5.6%	0.6%	0.1%	0.6%	0.1%	0.6%	0.1%
Residential Electric Space Heat	R09	8.4%	5.8%	8.0%	5.2%	8.4%	5.2%	8.0%	5.8%	0.4%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.3%	0.3%	0.4%	8.8%	5.2%	8.4%	5.2%	8.0%	6.5%
Residential Electric Heating and Cooling	R10	5.1%	3.4%	4.9%	3.0%	5.1%	3.0%	4.9%	3.4%	6.5%	2.0%	6.0%	2.0%	6.3%	2.3%	6.5%	2.0%	5.7%	2.6%	5.3%	3.0%	5.1%	3.0%	4.9%	3.8%
Residential Ventilation	R11	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%
Residential - Dehumidifier	R12	1.9%	2.4%	1.8%	2.2%	1.9%	2.2%	1.8%	2.4%	6.7%	7.3%	6.1%	7.3%	6.4%	8.2%	6.7%	7.3%	5.8%	9.1%	2.0%	2.2%	1.9%	2.2%	1.8%	2.7%
Residential Standby Losses - Entertainment Center	R13	3.8%	4.9%	3.6%	4.3%	3.8%	4.3%	3.6%	4.9%	4.0%	4.2%	3.7%	4.2%	3.8%	4.7%	4.0%	4.2%	3.5%	5.3%	3.9%	4.3%	3.8%	4.3%	3.6%	5.4%
Residential	R14	3.5%	5.2%	3.3%	4.6%	3.5%	4.6%	3.3%	5.2%	3.6%	4.6%	3.3%	4.6%	3.4%	5.1%	3.6%	4.6%	3.1%	5.7%	3.6%	4.6%	3.5%	4.6%	3.3%	5.8%

		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
		M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S
Standby Losses - Home Office																									
Commercial Electric Cooking	C01	5.9%	2.7%	5.6%	2.4%	5.9%	2.4%	5.6%	2.7%	6.0%	2.3%	5.5%	2.3%	5.8%	2.6%	6.0%	2.3%	5.3%	2.9%	6.1%	2.4%	5.9%	2.4%	5.6%	3.0%
Commercial Electric DHW	C02	5.9%	2.7%	5.6%	2.4%	5.9%	2.4%	5.6%	2.7%	6.0%	2.4%	5.5%	2.4%	5.8%	2.7%	6.0%	2.4%	5.2%	3.0%	6.1%	2.4%	5.9%	2.4%	5.6%	3.0%
Commercial Cooling	C03	0.7%	0.1%	0.7%	0.1%	0.7%	0.1%	0.7%	0.1%	14.0%	5.2%	12.8%	5.2%	13.4%	5.8%	14.0%	5.2%	12.2%	6.5%	0.7%	0.1%	0.7%	0.1%	0.7%	0.1%
Commercial Electric Heating	C04	7.7%	6.5%	7.4%	5.8%	7.7%	5.8%	7.4%	6.5%	0.4%	0.3%	0.4%	0.3%	0.4%	0.3%	0.4%	0.3%	0.3%	0.3%	8.1%	5.8%	7.7%	5.8%	7.4%	7.2%
Commercial Electric Heating and Cooling	C05	2.8%	2.0%	2.7%	1.8%	2.8%	1.8%	2.7%	2.0%	9.9%	3.7%	9.1%	3.7%	9.5%	4.2%	9.9%	3.7%	8.6%	4.6%	2.9%	1.8%	2.8%	1.8%	2.7%	2.3%
Commercial Indoor Lighting	C06	5.8%	2.8%	5.5%	2.5%	5.8%	2.5%	5.5%	2.8%	6.0%	2.4%	5.5%	2.4%	5.7%	2.7%	6.0%	2.4%	5.2%	3.0%	6.1%	2.5%	5.8%	2.5%	5.5%	3.1%
Grocery/Conv. Store Indoor Lighting	C07	4.5%	4.0%	4.3%	3.5%	4.5%	3.5%	4.3%	4.0%	4.8%	3.6%	4.4%	3.6%	4.6%	4.0%	4.8%	3.6%	4.2%	4.5%	4.8%	3.5%	4.5%	3.5%	4.3%	4.4%
Hospital Indoor Lighting	C08	4.2%	4.3%	4.0%	3.9%	4.2%	3.9%	4.0%	4.3%	4.4%	3.9%	4.0%	3.9%	4.2%	4.4%	4.4%	3.9%	3.9%	4.9%	4.4%	3.9%	4.2%	3.9%	4.0%	4.8%
Office Indoor Lighting	C09	6.1%	2.4%	5.8%	2.1%	6.1%	2.1%	5.8%	2.4%	6.4%	2.1%	5.9%	2.1%	6.1%	2.4%	6.4%	2.1%	5.6%	2.7%	6.4%	2.1%	6.1%	2.1%	5.8%	2.7%
Restaurant Indoor Lighting	C10	4.7%	3.9%	4.4%	3.4%	4.7%	3.4%	4.4%	3.9%	4.9%	3.5%	4.5%	3.5%	4.7%	3.9%	4.9%	3.5%	4.3%	4.4%	4.9%	3.4%	4.7%	3.4%	4.4%	4.3%
Retail Indoor Lighting	C11	5.1%	3.3%	4.9%	3.0%	5.1%	3.0%	4.9%	3.3%	5.5%	3.0%	5.0%	3.0%	5.2%	3.4%	5.5%	3.0%	4.7%	3.8%	5.4%	3.0%	5.1%	3.0%	4.9%	3.7%
Warehouse Indoor Lighting	C12	5.7%	2.8%	5.4%	2.5%	5.7%	2.5%	5.4%	2.8%	6.0%	2.5%	5.5%	2.5%	5.8%	2.8%	6.0%	2.5%	5.3%	3.1%	6.0%	2.5%	5.7%	2.5%	5.4%	3.1%
K-12 School Indoor	C13	6.6%	3.4%	6.3%	3.0%	6.6%	3.0%	6.3%	3.4%	4.3%	2.1%	3.9%	2.1%	4.1%	2.4%	4.3%	2.1%	3.7%	2.6%	6.9%	3.0%	6.6%	3.0%	6.3%	3.8%

		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
		M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S
Lighting																									
Indust. 1-shift (8/5) (e.g., comp. air, lights)	C14	7.3%	1.1%	7.0%	1.0%	7.3%	1.0%	7.0%	1.1%	7.8%	1.0%	7.1%	1.0%	7.5%	1.1%	7.8%	1.0%	6.8%	1.2%	7.6%	1.0%	7.3%	1.0%	7.0%	1.2%
Indust. 2-shift (16/5) (e.g., comp. air, lights)	C15	6.9%	1.5%	6.6%	1.4%	6.9%	1.4%	6.6%	1.5%	7.3%	1.4%	6.7%	1.4%	7.0%	1.6%	7.3%	1.4%	6.4%	1.7%	7.2%	1.4%	6.9%	1.4%	6.6%	1.7%
Indust. 3-shift (24/5) (e.g., comp. air, lights)	C16	5.0%	3.5%	4.8%	3.1%	5.0%	3.1%	4.8%	3.5%	5.4%	3.1%	4.9%	3.1%	5.1%	3.5%	5.4%	3.1%	4.7%	3.8%	5.3%	3.1%	5.0%	3.1%	4.8%	3.9%
Indust. 4-shift (24/7) (e.g., comp. air, lights)	C17	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%
Industrial Indoor Lighting	C18	6.4%	2.0%	6.1%	1.8%	6.4%	1.8%	6.1%	2.0%	6.8%	1.8%	6.2%	1.8%	6.5%	2.0%	6.8%	1.8%	5.9%	2.3%	6.7%	1.8%	6.4%	1.8%	6.1%	2.3%
Industrial Outdoor Lighting	C19	2.6%	6.6%	2.5%	5.9%	2.6%	5.9%	2.5%	6.6%	2.0%	5.3%	1.8%	5.3%	1.9%	6.0%	2.0%	5.3%	1.7%	6.6%	2.7%	5.9%	2.6%	5.9%	2.5%	7.4%
Commercial Outdoor Lighting	C20	3.4%	5.3%	3.2%	4.7%	3.4%	4.7%	3.2%	5.3%	2.7%	5.3%	2.5%	5.3%	2.6%	5.9%	2.7%	5.3%	2.4%	6.6%	3.5%	4.7%	3.4%	4.7%	3.2%	5.9%
Commercial Office Equipment	C21	5.5%	3.1%	5.2%	2.8%	5.5%	2.8%	5.2%	3.1%	5.6%	2.7%	5.1%	2.7%	5.4%	3.1%	5.6%	2.7%	4.9%	3.4%	5.7%	2.8%	5.5%	2.8%	5.2%	3.5%
Commercial Refrigeration	C22	5.6%	3.1%	5.3%	2.7%	5.6%	2.7%	5.3%	3.1%	5.6%	2.6%	5.1%	2.6%	5.4%	3.0%	5.6%	2.6%	4.9%	3.3%	5.8%	2.7%	5.6%	2.7%	5.3%	3.4%
Commercial Ventilation	C23	5.5%	3.1%	5.3%	2.7%	5.5%	2.7%	5.3%	3.1%	6.3%	2.2%	5.7%	2.2%	6.0%	2.4%	6.3%	2.2%	5.5%	2.7%	5.8%	2.7%	5.5%	2.7%	5.3%	3.4%
Traffic Signal - Red Balls, always changing or flashing	C24	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%

		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
		M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S
Traffic Signal - Red Balls, changing day, off night	C25	5.4%	3.1%	5.1%	2.8%	5.4%	2.8%	5.1%	3.1%	5.7%	2.8%	5.2%	2.8%	5.5%	3.1%	5.7%	2.8%	5.0%	3.5%	5.6%	2.8%	5.4%	2.8%	5.1%	3.5%
Traffic Signal - Green Balls, always changing	C26	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%
Traffic Signal - Green Balls, changing day, off night	C27	5.4%	3.1%	5.1%	2.8%	5.4%	2.8%	5.1%	3.1%	5.7%	2.8%	5.2%	2.8%	5.5%	3.1%	5.7%	2.8%	5.0%	3.5%	5.6%	2.8%	5.4%	2.8%	5.1%	3.5%
Traffic Signal - Red Arrows	C28	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%
Traffic Signal - Green Arrows	C29	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%
Traffic Signal - Flashing Yellows	C30	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%
Traffic Signal - “Hand” Don’t Walk Signal	C31	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%
Traffic Signal - “Man” Walk Signal	C32	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%
Traffic Signal - Bi-Modal Walk/Don’t Walk	C33	3.7%	4.9%	3.6%	4.3%	3.7%	4.3%	3.6%	4.9%	4.0%	4.3%	3.6%	4.3%	3.8%	4.8%	4.0%	4.3%	3.5%	5.4%	3.9%	4.3%	3.7%	4.3%	3.6%	5.4%
Industrial Motor	C34	6.9%	1.5%	6.6%	1.4%	6.9%	1.4%	6.6%	1.5%	7.3%	1.4%	6.7%	1.4%	7.0%	1.6%	7.3%	1.4%	6.4%	1.7%	7.2%	1.4%	6.9%	1.4%	6.6%	1.7%
Industrial Process	C35	6.9%	1.5%	6.6%	1.4%	6.9%	1.4%	6.6%	1.5%	7.3%	1.4%	6.7%	1.4%	7.0%	1.6%	7.3%	1.4%	6.4%	1.7%	7.2%	1.4%	6.9%	1.4%	6.6%	1.7%
HVAC Pump Motor (heating)	C36	5.6%	7.3%	5.3%	6.5%	5.6%	6.5%	5.3%	7.3%	1.3%	1.3%	1.1%	1.3%	1.2%	1.4%	1.3%	1.3%	1.1%	1.6%	5.9%	6.5%	5.6%	6.5%	5.3%	8.1%
HVAC Pump Motor (cooling)	C37	1.1%	1.5%	1.1%	1.3%	1.1%	1.3%	1.1%	1.5%	7.8%	8.5%	7.1%	8.5%	7.4%	9.5%	7.8%	8.5%	6.8%	10.6%	1.2%	1.3%	1.1%	1.3%	1.1%	1.6%

		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
		M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S
HVAC Pump Motor (unknown use)	C38	3.4%	4.4%	3.2%	3.9%	3.4%	3.9%	3.2%	4.4%	4.5%	4.9%	4.1%	4.9%	4.3%	5.5%	4.5%	4.9%	3.9%	6.1%	3.5%	3.9%	3.4%	3.9%	3.2%	4.9%
VFD - Supply fans <10 HP	C39	5.6%	2.4%	5.4%	2.1%	5.6%	2.1%	5.4%	2.4%	6.0%	3.1%	5.5%	3.1%	5.7%	3.5%	6.0%	3.1%	5.2%	3.9%	5.9%	2.1%	5.6%	2.1%	5.4%	2.7%
VFD - Return fans <10 HP	C40	5.6%	2.4%	5.4%	2.1%	5.6%	2.1%	5.4%	2.4%	6.0%	3.1%	5.5%	3.1%	5.7%	3.5%	6.0%	3.1%	5.2%	3.9%	5.9%	2.1%	5.6%	2.1%	5.4%	2.7%
VFD - Exhaust fans <10 HP	C41	5.0%	3.5%	4.8%	3.1%	5.0%	3.1%	4.8%	3.5%	4.3%	4.0%	3.9%	4.0%	4.1%	4.5%	4.3%	4.0%	3.7%	5.0%	5.3%	3.1%	5.0%	3.1%	4.8%	3.9%
VFD - Boiler feedwater pumps <10 HP	C42	6.2%	6.6%	5.9%	5.9%	6.2%	5.9%	5.9%	6.6%	1.4%	1.2%	1.3%	1.2%	1.3%	1.3%	1.4%	1.2%	1.2%	1.5%	6.5%	5.9%	6.2%	5.9%	5.9%	7.4%
VFD - Chilled water pumps <10 HP	C43	1.6%	0.8%	1.6%	0.7%	1.6%	0.7%	1.6%	0.8%	8.6%	7.9%	7.8%	7.9%	8.2%	8.9%	8.6%	7.9%	7.5%	9.9%	1.7%	0.7%	1.6%	0.7%	1.6%	0.9%
VFD Boiler circulation pumps <10 HP	C44	6.2%	6.6%	5.9%	5.9%	6.2%	5.9%	5.9%	6.6%	1.4%	1.2%	1.3%	1.2%	1.3%	1.3%	1.4%	1.2%	1.2%	1.5%	6.5%	5.9%	6.2%	5.9%	5.9%	7.4%
Refrigeration Economizer	C45	5.3%	7.6%	5.0%	6.8%	5.3%	6.8%	5.0%	7.6%	1.2%	1.4%	1.1%	1.4%	1.1%	1.5%	1.2%	1.4%	1.0%	1.7%	5.5%	6.8%	5.3%	6.8%	5.0%	8.5%
Evaporator Fan Control	C46	3.5%	5.4%	3.3%	4.8%	3.5%	4.8%	3.3%	5.4%	3.5%	4.4%	3.2%	4.4%	3.4%	4.9%	3.5%	4.4%	3.1%	5.5%	3.6%	4.8%	3.5%	4.8%	3.3%	6.0%
Standby Losses - Commercial Office	C47	1.2%	7.6%	1.1%	6.7%	1.2%	6.7%	1.1%	7.6%	1.2%	6.6%	1.1%	6.6%	1.1%	7.5%	1.2%	6.6%	1.0%	8.3%	1.2%	6.7%	1.2%	6.7%	1.1%	8.4%
VFD Boiler draft fans <10 HP	C48	5.4%	7.3%	5.2%	6.5%	5.4%	6.5%	5.2%	7.3%	1.3%	1.4%	1.2%	1.4%	1.3%	1.5%	1.3%	1.4%	1.2%	1.7%	5.7%	6.5%	5.4%	6.5%	5.2%	8.2%
VFD Cooling Tower Fans <10 HP	C49	1.1%	0.8%	1.1%	0.7%	1.1%	0.7%	1.1%	0.8%	11.4%	6.1%	10.4%	6.1%	10.9%	6.9%	11.4%	6.1%	9.9%	7.6%	1.2%	0.7%	1.1%	0.7%	1.1%	0.9%
Engine Block Heater Timer	C50	3.8%	9.1%	3.7%	8.1%	3.8%	8.1%	3.7%	9.1%	0.9%	1.6%	0.8%	1.6%	0.8%	1.8%	0.9%	1.6%	0.7%	2.0%	4.0%	8.1%	3.8%	8.1%	3.7%	10.2%
Door Heater Control	C51	4.4%	10.4%	4.2%	9.3%	4.4%	9.3%	4.2%	10.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.6%	9.3%	4.4%	9.3%	4.2%	11.6%

		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
		M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S	M-F	S-S
Beverage and Snack Machine Controls	C52	1.4%	7.2%	1.4%	6.4%	1.4%	6.4%	1.4%	7.2%	1.6%	6.4%	1.4%	6.4%	1.5%	7.2%	1.6%	6.4%	1.4%	8.0%	1.5%	6.4%	1.4%	6.4%	1.4%	8.1%
Flat	C53	5.3%	3.3%	5.0%	2.9%	5.3%	2.9%	5.0%	3.3%	5.5%	2.9%	5.0%	2.9%	5.3%	3.3%	5.5%	2.9%	4.8%	3.7%	5.5%	2.9%	5.3%	2.9%	5.0%	3.6%

5.6 Summer Peak Period Definition (kW)

To estimate the impact that an efficiency measure has on a Program Administrator's system peak, the peak itself needs to be defined. Illinois spans two different electrical control areas, the Pennsylvania – Jersey – Maryland (PJM) and the Midwest Independent System Operators (MISO). As a result, there is some disparity in the peak definition across the state. However, only PJM has a capacity market where an efficiency program can potentially participate. Because ComEd is part of the PJM control area, their definition of summer peak is being applied statewide in this TRM.

Being a summer peaking state, only the summer peak period is defined for the purpose of this TRM. The coincident summer peak period is defined as **1:00-5:00 P.M. Central Prevailing Time on non-holiday weekdays, June through August**.

Summer peak coincidence factors can be found within each measure characterization. The source is provided and is based upon evaluation results, analysis of load shape data (e.g. the Itron eShapes data provided by Ameren), or through a calculation using stated assumptions.

For measures that are not weather-sensitive, the summer peak coincidence factor is estimated whenever possible as the average of savings within the peak period defined above. For weather sensitive measures such as cooling, the summer peak coincidence factor is provided in two different ways. The first method is to estimate demand savings during the Program Administrator peak hour (as provided by Ameren). This is likely to be the most indicative of actual peak benefits. The second way represents the average savings over the defined summer peak period, consistent with the non-weather sensitive end uses, and is presented so that savings can be bid into PJM's Forward Capacity Market.

5.7 Heating and Cooling Degree-Day Data

Many measures are weather sensitive. Because there is a range of climactic conditions across the State, we engaged the Technical Subcommittee to provide their preferences for what airports and cities are the best proxies for the weather in their service territories. The result of this engagement is in the following table. All of the data represents 30-year normals[21] from the National Climactic Data Center (NCDC). Note that the base temperature for the calculation of heating degree-days in this document does not follow the historical 65 degree base temperature convention. Instead we used several different temperatures to more accurately reflect the outdoor temperature when a heating or cooling system turns on.

Residential heating is based on 60F, in accordance with regression analysis of heating fuel use and weather by state by the Pacific Northwest National Laboratory.[22] Residential cooling is based on 65F in agreement with a field study in Wisconsin.[23] These are lower than typical thermostat set points because internal gains such as appliances, lighting, and people provide some heating. In Non-Residential and industrial settings, internal gains are often much higher; the base temperatures for both heating and cooling is 55F[24]. Custom degree-days with building specific

[21] 30-year normals have been used instead of Typical Meteorological Year (TMY) data due to the fact that few of the measures in the TRM are significantly affected by solar insolation, which is one of the primary benefits of using the TMY approach.

[22] Belzer and Cort, Pacific Northwest National Laboratory in "Statistical Analysis of Historical State-Level Residential Energy Consumption Trends," 2004.

[23] Energy Center of Wisconsin, May 2008 metering study; "Central Air Conditioning in Wisconsin, A Compilation of Recent Field Research", p32 (amended in 2010).

[24] This value is based upon experience, and it is preferable to use building-specific base temperatures when

base temperatures are recommended for large C&I projects.

Table 5.4: Degree-Day Zones and Values by Market Sector

	Residential		C&I		
Zone	HDD	CDD	HDD	CDD	Weather Station / City
1	5,352	820	4,272	2,173	Rockford AP / Rockford
2	5,113	842	4,029	3,357	Chicago O'Hare AP / Chicago
3	4,379	1,108	3,406	2,666	Springfield #2 / Springfield
4	3,378	1,570	2,515	3,090	Belleville SIU RSCH / Bellville
5	3,438	1,370	2,546	2,182	Carbondale Southern IL AP / Marion
Average	4,860	947	3,812	3,051	Weighted by occupied housing units
Base Temp	60F	65F	55F	55F	30 year climate normals, 1981-2010

This table assigns each of the proxy cities to one of five climate zones. The following graphics from the Illinois State Water Survey show isobars (lines of equal degree-days) and we have color-coded the counties in each of these graphics using those isobars as a dividing line. Using this approach, the state divides into five cooling degree-day zones and five heating degree-day zones. Note that although the heating and cooling degree-day maps are similar, they are not the same, and the result is that there are a total of 10 climate zones in the State.

available.

Figure 3: Cooling Degree-Day Zones by County

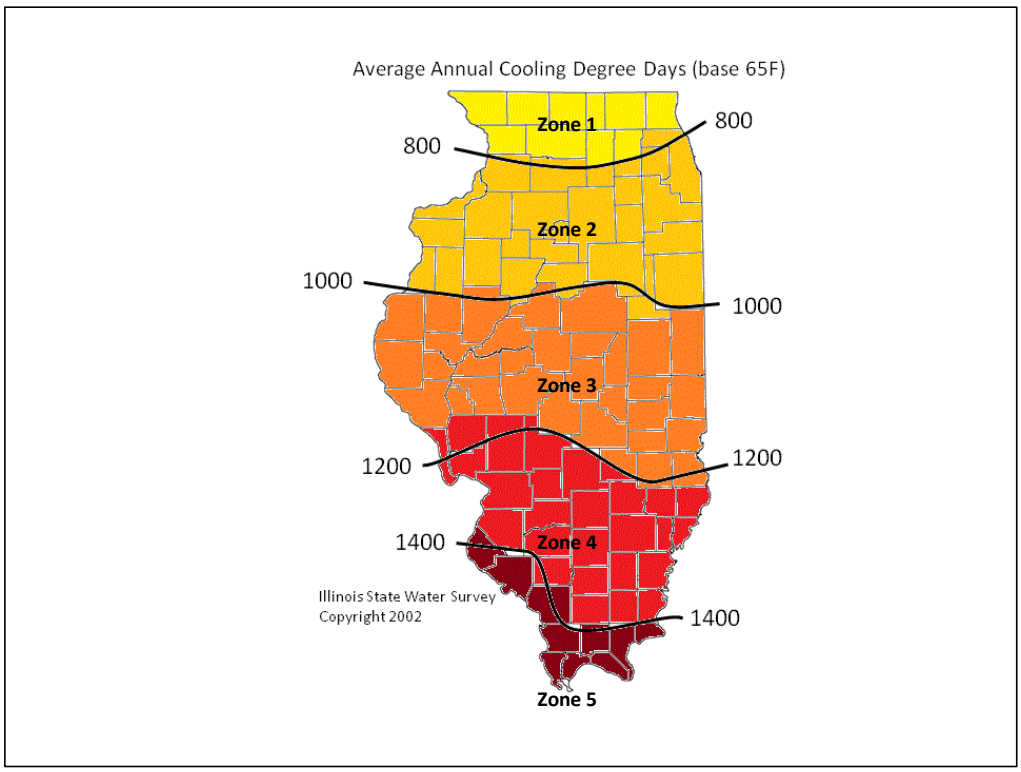


Figure 4: Heating Degree-Day Zones by County

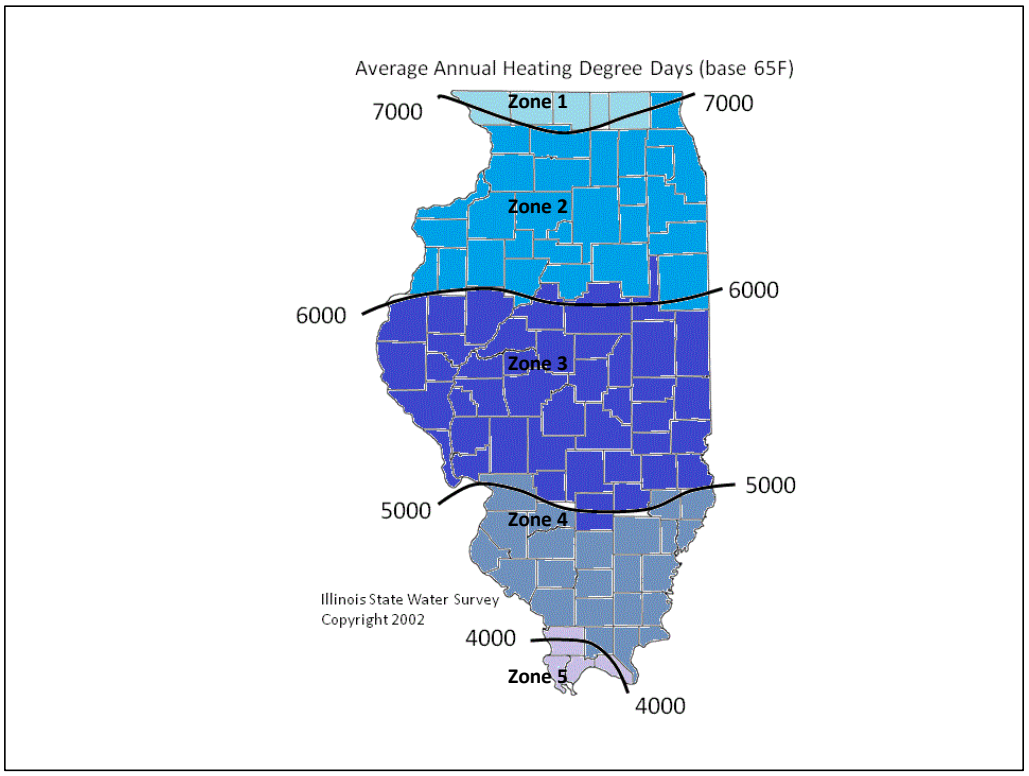


Table 5.5: Heating Degree-Day Zones by County

Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Boone County	Carroll County	Adams County	Clinton County	Alexander County
Jo Daviess County	Bureau County	Bond County	Edwards County	Massac County
Stephenson County	Cook County	Brown County	Franklin County	Pulaski County
Winnebago County	DeKalb County	Calhoun County	Gallatin County	Union County
	DuPage County	Cass County	Hamilton County	
	Grundy County	Champaign County	Hardin County	
	Henderson County	Christian County	Jackson County	
	Henry County	Clark County	Jefferson County	
	Iroquois County	Clay County	Johnson County	
	Kane County	Coles County	Lawrence County	
	Kankakee County	Crawford County	Madison County	
	Kendall County	Cumberland County	Marion County	
	Knox County	De Witt County	Monroe County	
	Lake County	Douglas County	Perry County	
	LaSalle County	Edgar County	Pope County	
	Lee County	Effingham County	Randolph County	
	Livingston County	Fayette County	Richland County	
	Marshall County	Ford County	Saline County	
	McHenry County	Fulton County	St. Clair County	
	Mercer County	Greene County	Wabash County	
	Ogle County	Hancock County	Washington County	
	Peoria County	Jasper County	Wayne County	
	Putnam County	Jersey County	White County	
	Rock Island County	Logan County	Williamson County	
	Stark County	Macon County		
	Warren County	Macoupin County		
	Whiteside County	Mason County		
	Will County	McDonough County		
	Woodford County	McLean County		
		Menard County		
		Montgomery County		
		Morgan County		
		Moultrie County		
		Piatt County		
		Pike County		
		Sangamon County		
		Schuyler County		
		Scott County		
		Shelby County		
		Tazewell County		
		Vermilion County		

Table 5.6: Cooling Degree-day Zones by County

Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Boone County	Bureau County	Adams County	Bond County	Alexander County
Carroll County	Cook County	Brown County	Clay County	Hardin County
DeKalb County	DuPage County	Calhoun County	Clinton County	Johnson County
Jo Daviess County	Grundy County	Cass County	Edwards County	Massac County
Kane County	Henderson County	Champaign County	Fayette County	Pope County
Lake County	Henry County	Christian County	Franklin County	Pulaski County
McHenry County	Iroquois County	Clark County	Gallatin County	Randolph County
Ogle County	Kankakee County	Coles County	Hamilton County	Union County
Stephenson County	Kendall County	Crawford County	Jackson County	
Winnebago County	Knox County	Cumberland County	Jefferson County	
	LaSalle County	De Witt County	Jersey County	
	Lee County	Douglas County	Lawrence County	
	Livingston County	Edgar County	Macoupin County	
	Marshall County	Effingham County	Madison County	
	Mercer County	Ford County	Marion County	
	Peoria County	Fulton County	Monroe County	
	Putnam County	Greene County	Montgomery County	
	Rock Island County	Hancock County	Perry County	
	Stark County	Jasper County	Richland County	
	Warren County	Logan County	Saline County	
	Whiteside County	Macon County	St. Clair County	
	Will County	Mason County	Wabash County	
	Woodford County	McDonough County	Washington County	
		McLean County	Wayne County	
		Menard County	White County	
		Morgan County	Williamson County	
		Moultrie County		
		Piatt County		
		Pike County		
		Sangamon County		
		Schuyler County		
		Scott County		
		Shelby County		
		Tazewell County		
		Vermilion County		

5.8 O&M Costs and the Weighted Average Cost of Capital (WACC)

Some measures specify an operations and maintenance (O&M) parameter that describes the incremental O&M cost savings that can be expected over its lifetime. For these measures, it is necessary to calculate the net present value (NPV) of O&M costs over the life of the measure, which requires an appropriate discount rate. The WACC is the most commonly used discount rate that is used in this context.

Each Program Administrator has a unique WACC that will vary over time. As a result, the TRM does not specify the NPV of the O&M costs. Instead, the necessary information required to calculate the NPV is included. For instance;

Baseline Case: O&M costs equal $150 every two years.

Efficient Case: O&M costs equal $50 every five years.

Given this information, the incremental O&M costs can be determined by discounting the cash flows in the Baseline Case and the Efficient Case separately using the applicable WACC. Then the NPV of the incremental O&M costs is calculated by subtracting one NPV from the other. This value is then used in the Program Administrator's cost-effectiveness screening process.

Those measures that include baseline shifts that result in multiple component costs and lifetimes cannot be calculated by this standard method. In only these cases, the O&M costs are presented both as Annual Levelized equivalent cost (i.e. the annual payment that results in an equivalent NPV to the actual stream of O&M costs) and as NPVs using a Statewide average real discount rate of 5.23%.

5.9 Interactive Effects

The TRM presents engineering equations for most measures. This approach is desirable because it conveys information clearly and transparently, and is widely accepted in the industry. Unlike simulation model results, engineering equations also provide flexibility and the opportunity for users to substitute local, specific information for deemed values. Furthermore, the parameters can be ~~updated ad-hoc~~ changed in TRM updates to be applied in future years as better information becomes available.

One limitation is that some interactive effects between measures are not automatically captured. Because we cannot know what measures will be implemented at the same time with the same customer, we cannot always capture the interactions between multiple measures within individual measure characterizations. However, interactive effects with different end uses are included in individual measure characterizations whenever possible.[25] For instance, waste heat factors are included in the lighting characterizations to capture the interaction between more-efficient lighting measures and the amount of heating and/or cooling that is subsequently needed in the building.

By contrast, no effort is made to account for interactive effects between an efficient air conditioning measure and an efficient lighting measure, because it is impossible to know the specifics of the other measure in advance of its installation. For custom measures and projects where a bundle of measures is being implemented at the same time, these kinds of interactive effects can be estimated, and the custom protocols include a procedure to estimate

[25] For more information, please refer to the 'Dealing with interactive Effects During Measure Characterization" Memo to the Stakeholder Advisory Group dated 12/9/11.