The Missouri Technical Reference Manual

Considerations and Recommendations for the Missouri Statewide TRM Update and Maintenance Process

Vermont Energy Investment Corporation

March 31, 2017

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VEIC has endeavored to develop a Statewide Missouri TRM using the best available data, robust analysis, and best practice guidance and recommendations alongside full engagement of all stakeholders. We feel that the current MO-TRM 2017 is illustrative of this balance.

To ensure this Statewide Missouri TRM remains robust, reliable, and relevant, it must be considered a "living" document that reflects changes in technology, the market place, and/or new and better technical information, data inputs, references, and measure calculations. Whenever possible it is recommended that a regular TRM Update Process should be supported by regulatory guidelines and aligned (sometimes cyclically) with existing utility program planning, evaluation, and implementation cycles.

Such an update process for Missouri should be developed in light of pending MEEIA rule revisions for Missouri. The Missouri Division of Energy and U.S. Department of Energy State Energy Program Managers have asked VEIC to provide an overview of considerations and recommendations for TRM updates, for use by the Missouri Oversight Committee and Division to help facilitate and support their public comment to the MEEIA revisions.

The following sections outline various considerations for what could drive the Missouri TRM Update Process, how the Process could be developed, what the roles and responsibilities of stakeholders could be, and illustrative timelines and other factors that have been considered important in other jurisdictions.

Please note, this document is not intended to drive any one approach and should be used as guidance only. This document is also not intended for comment, although VEIC is happy to help provide additional clarity to any questions stakeholders may have.

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TRM Measure Update Drivers

Once a TRM has been developed, it is vital that it is kept up to date, appended, and maintained in a timely and effective manner. Technology is constantly improving and markets are constantly changing. For a TRM to be considered a reliable document, it must keep pace with these changes or it will quickly become obsolete and the savings estimates may be perceived to be less reliable. There are three main points in time when a TRM is most likely to require changes:

- **New measure additions** – As new technologies become cost effective and included or considered for programs, they will need to be characterized and added to the manual.
- **Existing measure updates** – Updates will be required for a number of reasons. Examples include: the federal standard for efficiency of a measure is increased; the qualification criteria are altered; the measure cost changes; or a new evaluation provides a better value of an assumption for a variable. In such cases, the changes must be flagged and appropriate updates made to the TRM.
- **Retiring existing measures** – When the economics of a measure become such that it is no longer cost effective, or the free rider rate is so high that it is not worth supporting, the measure will be retired from programs and should be removed from the TRM.

In addition to these key factors the need to update the TRM can be driven by a number of additional events, including but not limited to, the following drivers:

- Addition of **new measure algorithms** perceived to be reliable for TRM inclusion
- Impact of **new code or legislative changes** to specific measures
- Introduction of **new technologies and technology advancements**
- Discovery of **errors in existing TRM** measure characterizations
- Changes to **industry standard practice**
- **Changes to program designs** and measure eligibility criteria
- **Improved TRM input values** developed through evaluations
- **Agreed revisions and improvements** to underlying modeling assumptions

TRM Measure Reliability Review and Sunset Dates

In addition to these proactively identified issues that will trigger an update to a TRM characterization, it is also recommended that regular review should be undertaken to assess that the information in older measures is still relevant and reliable. Setting a sunset date for each measure characterization in the TRM ensures that if a measure has not otherwise been updated before this date is reached, the measure will undergo a reliability review.

A sunset date and the factors that support setting the date are related to the term for which the TRM may be used. For example if the TRM is to be used for a longer five-year program planning cycle, then it is recommended that no sunset date be set for later than this period. If the TRM is to be used for a shorter one-two year planning cycle, then a sunset date may be set for a longer period (but it is recommended no date be longer than 5 years after initial characterization). Each measure sunset date can be informed by factors such as expected revisions to energy codes or federal standards, completion of upcoming evaluation or research efforts for individual measures, knowledge of rapidly changing technology, cost, baselines, or other factors, or expected shifts in current customer practices.

General practice recommends that as measure sunset dates approach, these measures be listed for review. Based upon the review, these dates can be extended, changes to the measure will be triggered, or measures may be removed if it is determined that it is not practice nor cost-effective to maintain the measure in the TRM.

Applicability of Measures Not Characterized

Through the Missouri Statewide TRM development process, the TAC attempted to identify all of the measures that are currently being implemented in programs. However due to budget constraints of the grant it was not possible to effectively characterize every measure being offered throughout the state within MO-TRM 2017.

That being said, as has been discussed during TAC calls throughout the TRM development process, Program Administrators should be free to implement prescriptive measures that are not included in the Missouri Statewide TRM as long as such measures have been filed and approved as cost-effective. Similarly, Program Administrators are not expected to offer every measure that is included in the Missouri TRM. Nevertheless, to support as comprehensive a Statewide TRM as possible, it is recommended that Program Administrators and other stakeholders submit any prescriptive program offering not currently characterized in the TRM for consideration as soon as practicable, using an agreed measure proposal submission form or work paper and process as discussed below.

Handling Mid-cycle Measure Updates

If Missouri establishes a *Recurring* (for example annual) *Update Process* as opposed to a *Continuous Update Process* it will be important to consider how to address changes that are identified mid-cycle. For example, there may be times when a Program Administrator has new measure information that they want to use before it can be formally included in the next TRM update or corrections, additions, and updates to existing measures that they feel more accurately supports a measure's savings impact. Examples include:

- Errors or omissions in TRM characterizations
- Identification of algorithms, input values, new evaluation results or results from potential studies
- New measures that do not yet appear in the TRM

In these cases, it is important for a TRM Update Process to clearly identify how such changes should be identified, justified and savings documented for comparison purposes for verification and plan filings (if required). It is recommended that this process include the following key steps:

1) Notification – if a Utility Energy Efficiency Program Administrator, the TRM Administrator, or other stakeholder believes that a current TRM measure characterization does not adequately reflect savings of a measure, then it should inform the TRM Administrator of its concern and present an alternative.
2) Justification - the party that identified the issue should identify the alternative value, approach, or assumption, including a description of why they believe the deviation from the TRM is appropriate (e.g., a particular measure may be in the process of getting updated in the TRM at that time).
3) Review - the TRM Administrator should notify the stakeholder group in charge of the Update Process (for example a Technical Advisory Committee-like group) of the information and provide opportunity for review and discussion. *(While the frequency of stakeholder engagement in between Update Cycles is yet to be determined for Missouri it is recommended that periodic check-ins occur and that such requests be reviewed during these times so that changes can be presented outside of the formal TRM process).*

4) Documentation - should the modification to the TRM measure be agreed upon, it is recommended that the stakeholder group ensure sufficient justification be presented in the form of a memo or other document that will illustrate savings verification using both the original TRM measure savings as well as using the new modified savings approach. This document can then be used as a comparative basis for savings estimates to be filed (if required) with the Commission by the Program Administrator.
5) Confirmation - if the modified savings approach are accepted, the savings values from this modified savings approach should be put forward for inclusion in the next formal TRM update cycle.

It is important to note that if a measure change is handled mid-cycle, a Program Administrator may be at risk for retroactive evaluation adjustments to the savings approach dependent on Commission approval and MEEIA guidance on the use of the TRM.

TRM Mistakes and Omissions

While all efforts are made during a measure's development to ensure no mistake nor omission is made if a TRM user discovers a clerical error it should be bought to the attention of the TRM Administrator directly. If a significant mistake or omission is found in the TRM that results in an unreasonable savings estimate, the measure should be put forward for a mid-cycle review. It is generally recognized that in the case of a measure error a Program Administrator will use the corrected TRM algorithms and inputs for the purpose of calculating savings toward their energy savings goals and that documentation be compiled to verify values and justify savings differences to the Commission (if required).

As above, any omission or mistake found in the TRM should be officially corrected through the TRM Update Cycle. It is also recommended that a summary list of changes be maintained in each TRM version to easily identify those changes specifically made due to errors and omissions***. This format could look like the table example below:***

Summary of Measures Changes Due to Mistakes/Omissions

Measure Number	Measure Name	Measure Code	Brief Summary of Change
2.x.x	High Performance and Reduced Wattage T8 Fixtures and Lamps	CI-LTG-T8FX-V01-XXXX	Fixing wattage assumptions and therefore savings.

Requesting Changes to the TRM

It is recommended that, in keeping with the transparent nature of the MO-TRM 2017 development, recommendations for future TRM Updates should be submitted to the identified Missouri stakeholder group or TRM Administrator charged with updating the TRM along with all supporting references. This will ensure the TRM continues to be maintained and updated in the spirit of its development by ensuring all updates are reviewed alongside considerations of the best available data, robust analysis and following best practice guidance and recommendations.

Many jurisdictions have developed templates and measure proposal submission forms to support their TRM Update Process. To help provide consistency in TRM update requests for Missouri it is recommended that a similar process be identified and approved for use by all submitters. In general any measure proposal process requires the submission of a "work paper" or "measure request" template. Ideally this template should include clear guidelines on the following:

1) Measure identification – the existing measure category, or end-use and market if new.

2) Measure documentation – any supporting references, data or other sources that support the measure request

In some jurisdictions, the "work paper" template may also take the form of an actual measure characterization and call for significant input on behalf of the submitter, prior to review. Depending on stakeholder engagement and resource availability this may be a suitable approach for Missouri. An example of such a measure request "work paper" is included as Appendix A.

Submitting Changes to the TRM

It is recommended that the submission process should be managed by the agreed TRM Administrator and that updates be collected either through an agreed website interface and central repository to allow for transparent review of all submissions by the stakeholders engaged in the Update Process or by using an "administrator" email account as used during the MO-TRM 2017 development process to which all stakeholders are recipients of.

Who can submit a Change?

It has been confirmed that the MO-TRM 2017 will be made publically available through the Missouri Division of Energy's website https://energy.mo.gov/. As such it is recommended that anyone should be allowed to make recommendations for future TRM Updates or suggest changes to current TRM measures, subject to Public Service Commission guidance.

Documenting TRM Changes/Requests

It is important as part of this process to maintain a record of changes made to the TRM over time. It is therefore recommended to establish and maintain a Master Manual, containing all versions of each TRM in chronological order, and an abridged Technical User Manual, in which only the current versions of active measures are included. Archiving older information can be facilitated by use of electronic interface such as a SharePoint site (if developed) or an electronic or web-based TRM application, with only the current version of the User Manual made publically available.

Maintaining a TRM Beyond a Word Version

Many states use a spreadsheet or database to house their TRM information either alone or alongside a regular TRM-Word version. Others are beginning to develop electronic, cloud-based TRMs as a complete replacement to their TRM-Word version. There are numerous merits afforded by moving towards a cloud-based system for developing and updating measure characterizations alongside additional costs and cost savings to consider.

In general, Program Administrators use Word versions of their TRMs to document savings methods and values sometimes alongside individual electronic spreadsheets or databases to store assumptions and savings for their programs. While effective and successful, both Word-TRMs and the supporting electronic spreadsheets can present their own suite of challenges to maintaining a TRM efficiently as outlined below:

- Word documents can be costly and time-consuming to update and may be difficult for a user to navigate.
- It can be difficult to know if users are working with the most recent version of the TRM and as such whether savings calculations are based on the most up-to-date input values and assumptions.

- It can be difficult to manage and distribute revised versions of Word documents if a proper maintenance and update schedule is not set up.
- Spreadsheet results have to be copied and/or rekeyed into internal tracking systems whenever TRM updates are made and can be damaged by users and produce incorrect results if not carefully entered.
- Users often must manage a variety of spreadsheets that can lead to confusion and errors.
- TRM spreadsheets are not structured to make measure comparisons and are time-consuming and challenging to import/export data from for this type of analysis.

Conversely, cloud-based tools can serve as automated data collection and storage platforms as well as calculators. They provide benefits through:

- Automating and sharing data and calculations, which:
  - Ensures accurate, approved claims from utilities
  - Reduces the need for "validation"
  - Eliminates redundant development of calculation tools across utilities
  - Puts important source data in a single location
  - Provides the same data for all to use
  - Eliminates isolated "pockets" of data (PDFs, Word, Excel spreadsheets)
  - Provides current real time data
  - Reduces or even eliminates costly and error-prone data "handoffs"
  - Always provides access to the current and correct version
- Ensuring that savings calculations are accurate – it is far easier to do quality assurance in one place than in multiple places
- Providing a historical record of all previous measures and versions
- Ensuring standards are applied across the entire jurisdiction (consistency)
- Reducing long-term cost of managing measures and their implementation
- Providing the ability to move to more-comprehensive measures (rather than lists of discrete values)
- Simplifying compliance for utilities
- Providing the ability to include additional automation, e.g., persistence of claims/calculations
  - Ability to collect more-granular data for deeper/better analysis
  - Timeliness: ability to see previous years' results data in real-time
  - Planning measures and "what if" scenarios

Statewide, costs are reduced by:

- Implementing all calculations in one place – there are fewer redundant efforts across utilities implementing calculators.
- Providing versioning control – everyone is always using the correct version; data validation work is reduced (lowering EM&V costs).

- Standardizing information – everyone is using known common claims calculations; validation needs are reduced.
- Providing transparency – all backup measure characteristic documentation is stored and versioned with the current calculators, and is available to all.

That being said, additional costs for moving to a cloud-based system depend on many factors. Simply licensing an off the shelf tool to store measure data that can be accessed through the internet may cost a few tens of thousands of dollars per year on top of the cost of maintaining the content. Up-front costs to develop a custom robust calculation tool that integrates directly with the specific utility tracking systems might range from $100,000 to $400,000, with additional yearly licensing fees for ongoing interface with each utility.

As the first Statewide TRM, the 2017 Missouri TRM was developed as a Word document to ensure the full transparent review and consideration of each measure's underlying assumptions, supporting data and calculations by the stakeholder collaborative during its development. Before consideration of replacing the update of this Word-TRM document with a separate cloud-based system, VEIC recommends waiting until further guidance is given from the Public Service Commission regarding the TRM's use, and the subsequent evaluation of the users' experience and cost-benefit trade-offs.

Potential TRM Stakeholder Roles and Responsibilities

Although any party is free to suggest TRM Updates, it is recommended that the MO-TRM update process identify key roles and responsibilities for specific stakeholders to help ensure the Update Process is effective, provides sufficient review, and is independent and transparent.

Given the success of the collaborative engagement of stakeholders in the development of the Missouri TRM through the Oversight Committee (OC) and Technical Advisory Committee (TAC) it is recommended that these group structures continue to operate and serve similar functions as established during the initial TRM development to support the TRM Update Process. The following list of stakeholders and key responsibilities can be used as a starting point regarding the roles in the process.

Program Administrators (Utilities and other Efficiency Program Administrators) – The Program Administrators have the primary responsibility of providing and implementing energy efficiency programs in a cost-effective manner that (where applicable) meet their filed and approved energy savings targets. In the context where the statewide MO-TRM is approved by the Commission, the Program Administrators may also be responsible for tracking program participation, reporting estimates of energy savings using the MO-TRM values (where such values exist), estimating cost effectiveness, and implementing the TRM savings values, including TRM Measure Codes and other information necessary to apply the TRM, through their tracking systems. In this context, to support the ongoing maintenance and update of the TRM it is strongly recommended that Program Administrators collaborate alongside the TAC and Evaluators to help identify and prioritize TRM Updates. In short Program Administrators should be engaged to help:

- Identify need for new or revised measure characterization – usually due to program changes or program/market feedback
- Research and develop first draft measure characterizations – for needs that the utilities identify
- Contribute to second draft measure characterizations following feedback on first draft from all parties
- Give feedback on draft measure characterizations from other parties
- Participate in the TAC for formal discussion and dispute resolution when needed
- Give input to Oversight Committee if TAC process does not resolve all issues

Office of Public Counsel (OPC) and Commission Staff – MO stakeholders should consider the important role and responsibility of both the OPC and Commission staff in the TRM Update Process. In other jurisdictions the OPC is charged with ensuring that any changes identified through the TRM update process are critically examined to ensure that the consumer's view is fully taken into account prior to any determination made by the Commission. Similarly, in other jurisdictions Commission staff are charged with submitting the Update Reports to the Commission that identify those recommendations approved by consensus for TRM updates or other roles subject to Commission guidance, such as the oversight of a TRM Administrator.

Evaluators (Evaluation Teams, Independent Consultants) – Evaluators in any jurisdiction have the primary responsibility to provide independent evaluations of the performance of a Program Administrators' energy efficiency portfolios. It is recommended that to support this responsibility in the context of a "Commission-approved TRM", evaluators will use the TRM to perform *savings verification* for prescriptive measures covered by the TRM to inform future TRM Updates. Where Evaluators are active in this capacity and under this context it is recommended that they should coordinate and collaborate with the TRM Administrator and other stakeholders as identified to determine the appropriate data, and analysis that supports TRM savings verification and TRM Updates as put forward. It is recommended that to help facilitate future Missouri TRM updates that are based on savings verifications Evaluators participate as active stakeholders in the TRM Update Process as they help to:

- Provide input to Utility Energy Efficiency Program Administrators to identify need for revised measure characterization
- Provide input on draft measure characterizations developed by other parties
- Participate in TAC meetings when appropriate
- Perform program evaluations to inform the TRM - including statewide market assessment and baseline studies, savings impact studies (to measure the change in energy and / or demand use attributed to energy efficiency), and other energy efficiency program evaluation activities
- Verify energy and capacity savings claims of each program and portfolio
- Ensure proper utility use of TRM in savings verification/evaluation process

Missouri Oversight Committee (OC) – Current OC member responsibilities including providing advice and comment on all policy related TRM issues including when needed the oversight of technical inputs to the TRM when requested. Considering this structure is already in existence, VEIC recommends maintaining this or a similar structure for stakeholders through which recommended TRM Updates are reviewed prior to the Commission Staff submitting an Update Report. Subject to pending Public Service Commission guidance and available resources, the OC may also consider taking on the role and responsibility of hiring and managing a TRM Administrator if an Independent Consultant is approved in this capacity.

Missouri Technical Advisory Committee (TAC) – Current TAC members' primary responsibility is to evaluate and discuss the development, and substantive review of, all technical concerns surrounding the TRM measures. During a TRM's Update it is recommended that a similar structure be supported to facilitate the effective consensus consideration of all TRM change requests. As such it is recommended that this be the main group to which all recommendations for TRM Updates shall be submitted before forwarding final recommendations to the Missouri Oversight Committee to take forward with OPC/Commission Staff.

TRM Administrator (Independent Consultant) – In many jurisdictions a statewide TRM update process is managed by an independent third-party, generally referred to as the TRM Administrator. This entity has primary responsibilities to manage updates to the TRM document, coordinate among other identified stakeholders and if desired serve as an independent technical resource. The TRM Administrator can serve in several different capacities. The TRM Administrator may be considered the lead coordinator of the Update Process but also provide the direct technical support to the development of new TRM measures and

measure updates. Alternatively, the TRM Administrator may be considered the lead coordinator of the update process but look to the TAC group to drive the technical review and consideration of requests through work papers etc. Determining which role and the level of engagement that a TRM Administrator may take on in Missouri will require the careful consideration of the technical resource need and availability within the identified stakeholder group as well as an appropriate consideration of how to best balance administrative costs against the data collection and other participant burden to ensure an updated TRM. To help guide conversations and budget considerations it is important to consider the work that an independent TRM Administrator may be required to do including:

- Identification of the need for revised measure characterization (usually based on knowledge of local or other relevant evaluation studies)
- Research and development of first draft measure characterization
- Feedback on first draft measure characterizations from other parties
- Development of second draft measure characterizations following feedback on first draft from all parties
- Coordination of stakeholder groups such as TAC for formal discussion and dispute resolution when needed
- Support to Oversight Committee if TAC process does not resolve all issues
- Management and updates for TRM manuals (after approval of changes)

Depending on future resource commitments by stakeholders in Missouri it is recommended that the TRM Administrator act as both facilitator and lead technical advisor for at least the first cycle of the MO-TRM Update Process.

TRM Update Budget and Other Considerations

Like the budget for initial TRM development, budgets for on-going update and maintenance of the TRM depend most critically on: the number of new measures to be introduced; the number of existing measures to be updated; the level of accuracy to be obtained; and the level of other stakeholder involvement in the measure development, review, and approval process. It is not uncommon to see as many as 20-25 new measures added during an annual update cycle, with updates needed for an additional 30-45 measures.

Estimates of annual costs for TRM updates for scopes of this size can range from $125,000 to $200,000 and there can also be additional variations to consider in this budget if for example evaluation data indicate that a change in methodology is required and modeling is needed that would require additional hours to accomplish the work.

In most jurisdictions the budget for a TRM Update and Maintenance is covered directly through an annual financial commitment and cost-share approach and agreement between utilities and other stakeholders. If Missouri were to adopt a similar funding tactic, it is recommended that Missouri establish a clear idea of how much budget, time and effort can be committed to an Update and Maintenance process as soon as possible so this can help better guide decisions. For example, the approach could be to only cover 15 measures a year or those measures not currently characterized in the initial MO-TRM 2017. Budgets and expectations could then be set to cover those measures as well as provide greater clarity to stakeholders regarding their associated participation and internal resource costs.

Coordination and Considerations for a TRM Update Schedule

Because technology and markets are so dynamic, a structured and ongoing TRM Update Process is necessary. The TRM Update Process is most effective when it is aligned with existing program planning, evaluation, and implementation cycles. These cycles have not been clearly identified under the Missouri TRM project but for the benefit of the TRM Update Process it is recommended that these cycles be reviewed to help establish the most effective Update Schedule for the statewide TRM. Further because each of these cycles is best served by having the most up-to-date information available, there should be a strong, sometimes cyclical relationship between the TRM development and update process, annual compliance reports, savings verification processes, evaluations, program planning, and any other compliance needs. As such, we strongly recommend coordinating the TRM update process with these activities.

An illustrative timeline established from such a coordinated process is shown in the table below that highlights an annual update process.

<table>
<tr><th></th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td rowspan="2">Utilities</td><td colspan="2">Draft annual savings report</td><td colspan="3">No TRM submittal during savings review, evaluations</td><td></td><td colspan="6">Draft new or updated measure characterizations developed and submitted to TRM Administrator; participate in TAC</td></tr>
<tr><td colspan="3"></td><td>Evaluation response</td><td>Prior year data finalized</td><td colspan="6">Respond to evaluation recommendations</td></tr>
<tr><td rowspan="2">Evaluators</td><td></td><td></td><td colspan="3">Savings review and evaluation</td><td></td><td colspan="6">Participate in TAC meetings; provide evaluation recommendations</td></tr>
<tr><td></td><td></td><td colspan="3">No TRM review during savings review, evaluations</td><td></td><td colspan="6">Refer need for TRM updates to TRM Administrator; provide input on characterizations</td></tr>
<tr><td>TRM Administrator</td><td></td><td></td><td colspan="3">No TRM during savings review and evaluation</td><td></td><td colspan="6">Propose/develop new or updated measure characterizations; review drafts provided by utilities; participate in and facilitate TAC</td></tr>
<tr><td>Oversight Committee</td><td></td><td></td><td></td><td></td><td></td><td>Review final savings determination</td><td colspan="6">Participate in TAC meetings; approve final TRM updates</td></tr>
</table>

In this example, the process of incorporating new and better information into the TRM is occurring on an annual basis. Further it is assumed that utility updates occur in the first half of the year and updates to the TRM would occur only in the second half of the year. This type of sequencing is preferable as it can help ensure that the best available data are available for utility planning for the following year, and that best available assumptions are in place prior to the start of the new program year.

In addition, the rationale for not updating the TRM during the first half of the year is that it is assumed that this time is devoted, in part, to documenting, verifying and approving utilities savings claims from the previous year and program administrators and evaluators would be unlikely to have the time or focus for considering changes to measure characterizations during this time.

An alternative approach would be to provide for ongoing or two rounds of TRM review each year, which would give the opportunity to have updated savings assumptions reviewed and approved more often, reducing the time that a program administrator might be at risk of providing services using not-yet-approved measure characterizations.

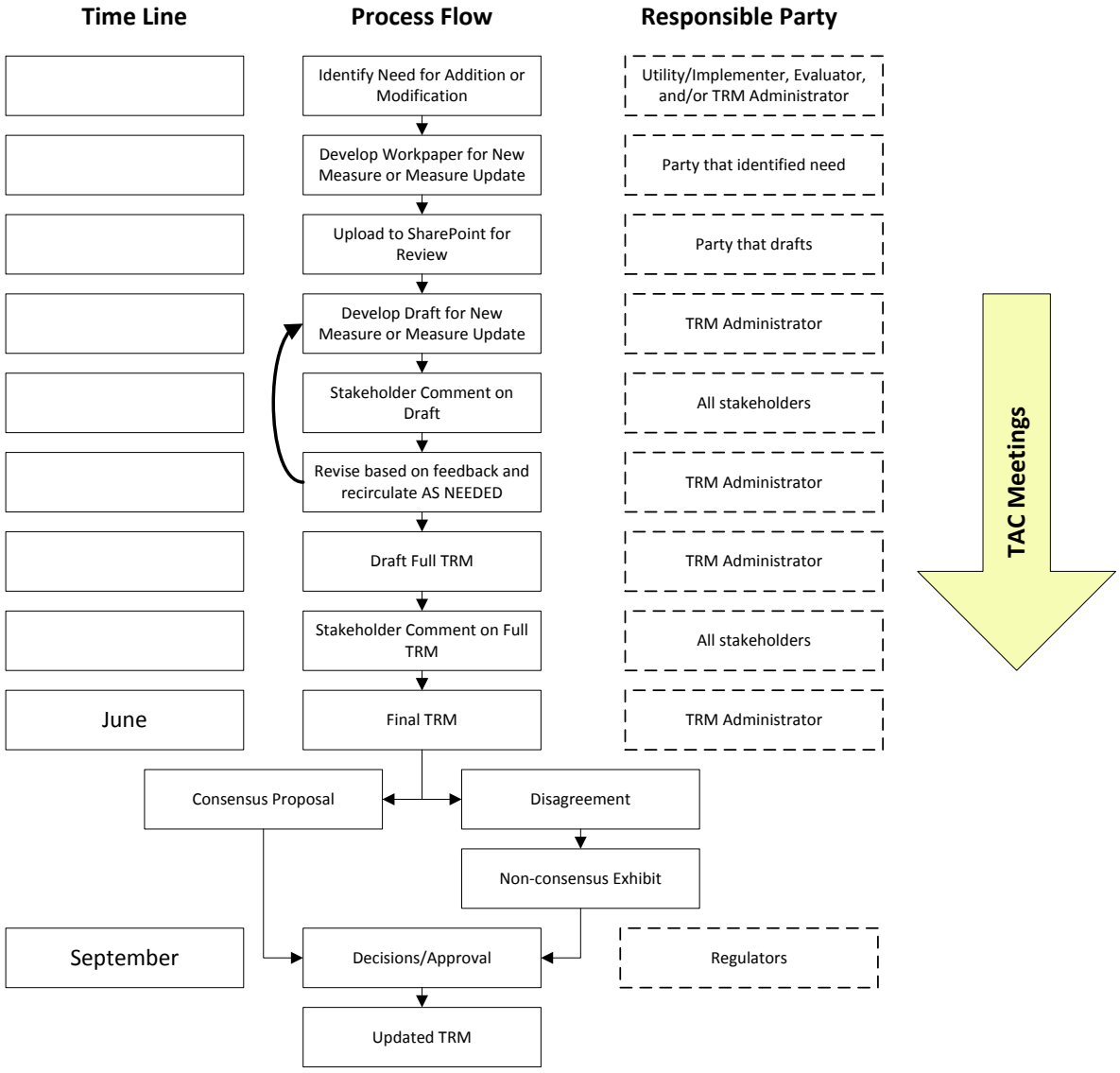
Choosing an Update Timeline and Process

The process of incorporating new and better information into the TRM can occur on an annual basis as highlighted above, or on a more regular continuous basis. It will be important for the Missouri stakeholder group to identify the frequency of scheduled updates early on. This is determined by many factors, but most directly on the budget, resources and stakeholder engagement process to support the frequency of updates.

Where statewide TRMs are developed through a collaborative process of multiple stakeholders such as in Missouri an annual update process is often preferred as this helps support clear planning and timing for the engagement of stakeholders as well as ensures that the research findings from one program year are easily tracked and put into effect at the beginning of the next program year.

To support an annual process for a TRM update in addition to ensuring all templates, stakeholder roles and other factors are in place, it will be important for Missouri to develop a specific work flow to support the TRM Update Process. This will help to guide stakeholders and the TRM Administrator on when and with whom the process starts, how best to coordinate the review period to ensure sufficient time is provided for measure development and quality control as well as final submission.

The flowchart below is an illustrative example of recommended steps that will result in an effective review and TRM Update Process based on an annual cycle.



As noted early in this document and as illustrated in this chart we consider a Technical Advisory Committee (TAC) as playing a critical role in discussing and resolving technical concerns during an Update Process. We also recognize that this process requires a number of different players and roles (as outlined in the sections above) to ensure effectiveness, sufficient review, and independence. The specific parties who will hold these roles in the Missouri TRM maintenance context should be clarified as early as possible and be guided by consideration of the key responsibilities that each party will have.

The process above also assumes that there are several potential stages of "give and take" on draft modifications to the TRM. At a minimum, it is recommended that there is at least one round of informal feedback and comment between the program administrators and the independent reviewer (TRM Administrator or otherwise). It is strongly advised that participants use a Technical Advisory Committee structure to provide a formal opportunity for input and a venue for resolution of technical disputes prior to any submission to the decision-makers. As during the Missouri's TRM initial development, this group would include representation from the program administrators, the evaluators (when deemed useful), the TRM Administrator, and other identified stakeholders.

Appendix A: Example Work Paper

Missouri Statewide
Technical Reference Manual

[Work Paper Title]

[New Measure or Change to Existing Measure]
[Measure Name and Section # if applicable]
[Measure Code if applicable]

[Author, Company]
[Date]

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Table 1 Work Paper Revision History

#	MM/DD/YY	Author, Company	Summary of Changes

Overview

Provide a brief summary of *New Measure* or *Change* proposed to existing measure and the rationale behind the change:

New Measure Characterizations

Each measure characterization uses a standardized format that includes at least the following components. Measures that have a higher level of complexity may have additional components, but also follow the same format, flow and function.

Please provide text for each of the sections below with appropriate citations in footnotes (see section #4) and upload any references or calculation sheets to the agreed website interface or central repository to allow for transparent review of all submissions by the stakeholders engaged in the Update Process or by using an "administrator" email account as used during the MO-TRM 2017 development process to which all stakeholders are recipients of.

DESCRIPTION

Brief description of measure stating how it saves energy, the markets it serves and any limitations to its applicability. Finish with the following text:

"This measure was developed to be applicable to the following program types: [**enter shorthand program type as outlined in Volume 1 of MO-TRM 2017]. If applied to other program types, the measure savings should be verified."

DEFINITION OF EFFICIENT EQUIPMENT

Clearly define the criteria for the efficient equipment used to determine delta savings. Include any standards or ratings if appropriate.

DEFINITION OF BASELINE EQUIPMENT

Clearly define the efficiency level of the baseline equipment used to determine delta savings. Include any standards or ratings if appropriate. If a Time of Sale measure the baseline will be new base level equipment (to replace existing equipment at the end of its useful life or for a new building). For Early Replacement or Early Retirement measures the baseline is the existing working piece of equipment that is being removed.

DEEMED LIFETIME OF EFFICIENT EQUIPMENT

The expected duration in years (or hours) of the savings. If an early replacement measure, also include the assumed life of the existing unit. Measure life may be represented in hours for products whose useful life is determined primarily by the amount of use they receive.

DEEMED MEASURE COST

For time of sale measures, provide incremental cost from baseline to efficient. Installation costs should only be included if there is a difference between each level. For Early Replacment the full equipment and install cost of the efficient installation should be provided in addition to the full deferred hypothetical baseline replacement cost.

LOADSHAPE

Define the appropriate loadshape to apply to electric savings. If a new loadshape is developed it should be noted and provided for review

COINCIDENCE FACTOR

Provide the summer coincidence factor to estimate the impact of the measure on the utility's system peak.

Algorithm

CALCULATION OF ENERGY SAVINGS

*Provide algorithms followed by list of assumptions with their definition. Provide either a single deemed value, lookup table with deemed values based on input selection, or indicate if its an input variable. Use footnotes to indicate the source of the deemed variables. Use * rather than x for multiplication and try to avoid nested algorithms.*

If there are no Input Variables, there will be a finite number of Output values. These should be identified and listed in a table. Where there are custom inputs, it is often a good idea to provide an example calculation to illustrate the algorithm and provide context. It is imperative that it be labeled with "For example" and placed within a text box, such that it does not get mistaken for a deemed result.

ELECTRIC ENERGY SAVINGS

SUMMER COINCIDENT PEAK DEMAND SAVINGS

NATURAL GAS SAVINGS

WATER IMPACT DESCRIPTIONS AND CALCULATION

DEEMED O&M COST ADJUSTMENT CALCULATION

Only required if the operation and maintenance cost for the efficient case is different to the baseline. If so, provide the frequency and cost of any replacement parts or maintenance. For a select number of measures the O&M cost may change significantly over the life of a measure (e.g. the replacement baseline bulbs due to EISA impacts). In these cases it is advisable to calculate an equivalent annualized payment that provides the same net present value as the actual stream of costs over the measure life.

Proposed Changes to Existing Measures

Copy existing TRM measure from the MO-TRM 2017 dated March 31st, 2017 accessible on the Missouri Division of Energy's TRM website at https://energy.mo.gov/ and paste the existing measure characterization below in its entirety, then turn on tracked changes and provide proposed edits in redline with appropriate citations (see section 4 below). Upload any new references or calculation sheets to the agreed website interface and central repository to allow for transparent review of all submissions. If a change requires further explanation that should not be in the characterization itself, submit an email to the stakeholder group and administrator email account to ensure this can be addressed during technical review of the measure change request.

References

Please refer to the Chicago style for variances on format citations. Please upload any new references or calculation sheets to the Tracker item.

http://www.chicagomanualofstyle.org/tools_citationguide.html

EXAMPLES:

Paper presented at a meeting or conference (Including internal work papers)

Author Name, "Paper title" (paper presented at the annual meeting for the Organization Name, City, State, Month Day, Year).

Website

"Title," last modified Month Day, Year, URL

E-mail

Author Name, e-mail message to author, Month Day, Year.

Item in a commercial database

Author Name. "Source Title" Publisher, Year. Database Name

Book: Chapter or other part of a book

Author Name, "Chapter," in Title, City: Publisher, Year, page range

Book: Published electronically

Author Name, "Chapter," in Title, City: Publisher, Year, Accessed Month Day, Year. URL.

Journal Article in a print journal (Use this for program evaluations.)

Author Name, "Article Title," Journal Name edition (Year): page

Author Name, "Evaluation Title," Utility Name, Program or Measure Name (Date): page

Journal Article in an online journal

Author Name, "Article Title," Journal Name edition (Year): page, accessed Month Day, Year, dio:xx.xxxx/xxxxxx.

Stakeholder Comments

If adding comments to an existing work paper, submit an email to the stakeholder group and administrator email account to alert others and ensure this can be addressed during the next technical review.