establish baseline efficiency levels including year of issue, chapters or sections referenced for the project and the specific requirements of the code and/or standard and how it was applied in the project analysis. If this information is fully documented under Section B.1.1, reference that section here.

Measure Variables

Describe the variables that impact project energy use, the impacts of the measure on any of the variables and how the values for the variables and energy use were established. Common variables are listed below, add or delete as needed to accurately describe the variables associated with the measure. Add quantitative information regarding the project variables in Table 24 - Measure Variables. Document all equipment information for the sections below using the Documentation Summary Worksheet.

Equipment Loading

Describe the equipment loading, variations in loading, percent loading and load profiles during the performance hours.

Operating Conditions

Seasonal and Daily Variability in Schedule

Describe any seasonality that affects the measure (production, school schedules, etc.) Provide documentation of data sources and assumptions used in the analysis.

Production

For industrial process measures, document units of production used for baseline and efficient cases, product variations included and the daily and seasonal variation in production.

Weather

Describe any weather dependence of the measure.

Controls

Describe equipment controls, any differences in baseline and efficiency case controls and how control sequences are accounted for in the analysis.

Interactive Effects

Describe interactive effects including waste heat, additional heating required and interactions with other measures or systems that will impact energy consumption.

Measure Life

State recommended measure life and reference for basis of recommendation.

Table 24 - Measure Variables

Variable	Applies (Y/N)	Values Used and Engineering Units	Source (eg. metering, customer interview, production log, etc.)
Equipment Loading			
Operating Schedules			
Production Schedules			
Occupancy Schedules			
Weather			
Production			
Controls			
Interactive Effects			

C. Metering and Data Collection

Prepare a metering plan for the project using this section of the document and indicating the intended analysis approach in Section D. Upon completion of metering and analysis, update this document to reflect actual findings and final analysis approach.

Metering Approach

Discuss the approach to energy and demand metering including load shape and coincident demand determination from meter data. Describe when metering occurred and how it is deemed to represent the post installation, annual operating conditions. Provide justification and supporting documentation for all assumptions and metering techniques using the Documentation Summary Worksheet.

Data Collection Methodology

Indicate the primary method(s) used to obtain the data needed for TRM Section 2 equations.

Power Metering _____

Data logging _____

DDC/PLC _____

Interval Data _____

Customer Interview _____

Other (describe) _____

Table 25 - Project Data Acquisition

Data Collection Method [1]			
When data was collected (pre/post) installation			
Measure(s) Affected			
Equipment monitored			
Parameter measured			
Measurement equipment			
Observation frequency			
Metering duration			
Sensor type			
Accuracy of sensors			
Overall accuracy of meter system			
Verify whether meter was synchronized to NIST			

[1] Indicate data collection method(s) across the top; not all rows apply for all data collection methods. Duplicate table as needed to capture all data collection methods used for the measures associated with this project

Equipment Calibration

Discuss calibration procedures used to maintain calibration of any metering and/or logging equipment used in the metering process. Where DDC and/or PLC devices and systems were used to obtain project data, describe the calibration protocol and document the results in the Documentation Summary Worksheet.

Data Cleaning and Data Reduction

Discuss steps taken to align timestamps, fill gaps in raw data and address other data issues such as inaccurate or inconclusive readings. Depending on the level of verification required by the program, include raw, cleaned, and analyzed datasets as appropriate in the Documentation Summary Worksheet.

D. Energy and Demand Analysis

Energy and Demand Analysis Approach

Describe the energy and demand savings calculation approach for each measure. Present formulae; the basis for each variable should be documented in Sections B and C above. If modeling is used, describe the simulation tool and modeling approach. Describe the approach to determining the coincident demand savings for electric efficiency measures. All project and measure analysis documentation shall be submitted as part of the project documentation in the Documentation Summary Worksheet.

Calculation Methods

Describe the calculation methods and tools used to develop the savings analysis for the project. Include a discussion of how interactive effects were handled in the analysis. Refer to the TRM for more details on interactive effects.

Computer Modeling

Describe the approach to computer modeling, software used including, year, version and source, the modeling parameters addressed and the confidence in the model results relative to predictions of annual energy use reduction. Document the software year, version, source, and supporting documentation for software algorithms in the Documentation Summary Worksheet.

Energy and Demand Savings Analysis

Complete this section for each of the measures named above in accordance with Sections 2 through 4 of the C&I Custom Measure TRM for Retrofit and/or Equipment Replacement and report the final results in the Projects Savings Summary in Section A above. Perform the savings analysis according to the following algorithm.

Step 1. Enter the system description and conditions into Table 27 using the example below as a guide. Include all modes of operation that occur throughout the course of a year. For variable loads and schedules, enter 'variable' in the Hours, Coincidence Factor, and Load Factors columns.

Table 26 - System Conditions Example

j	subsystem	annual hours	CF coincidence factor	system mode	full load kW	LF load factor
1	compressors	700	variable	max	10	variable
2	compressors	1500	variable	unloaded	10	variable
3	bank 1 and 2 cooling tower fans	700	variable	max	8	variable
4	bank 1 only cooling tower fans	1500	variable	unloaded	4	variable
5	condenser water pump	2200	1.00	max	20	1.00
6	condenser water pump	2200	1.00	unloaded	20	1.00

Table 27 - System Description - Measure 1

J	Subsystem	Hours	Coincidence Factor	System mode	Full load kW [1]	Load Factor [2]
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

[1] Nameplate kW.

[2] Typically less than 1.00 unless the equipment was sized to run at full speed.

Step 2. Use the equations in TRM Section 2 to calculate the following quantities in Table 28 - Calculated Energy Consumption and Demand Summary below: $Energy_{eff}$, $Energy_{base}$, $C\ Load_{eff}$, $C\ Load_{base}$ and the corresponding savings $Energy_{saved}$ and $C\ Load_{saved}$. Where the Hours, Coincidence Factor, and Load Factor are variable in Step 1 above, such as for weather dependent systems or other variable loads and schedules, a comprehensive 8760 analysis approach is required for affected terms in the equations. For subsystems 'J' which are constant and fully defined in the table above, it is acceptable to calculate these terms directly without using an 8760 analysis.

Table 28 - Calculated Energy Consumption and Demand Summary [1]

	Baseline Case	Efficient Case	Annual Energy Savings	Notes
Measure 1				
Annual Energy Use Electric				
Coincident Electric Demand				
Annual Gas Use				
Measure 2				
Annual Energy Use Electric				
Coincident Electric Demand				
Annual Gas Use				

[1] Add rows for additional measures and for reporting impacts on unregulated energy sources. Indicate NA if a listed energy source is not affected. Electric measures must have both energy and coincident demand analysis completed.

E. Additional Information

Provide supporting documentation for all information referenced in Section E using the Documentation Summary Worksheet.

Project Cost

Document the cost of each measure by supplying electronic copies of quotes and invoices. For equipment replacement and new construction projects, the measure cost is the incremental cost above the baseline equipment. For retrofit projects the cost is inclusive.

Table 29 - Calculated Cost [1]

	Baseline Case (leave blank for Retrofit)	Efficient Case	Incremental Cost of Efficient Measure (total inclusive cost for Retrofit)	Notes
Measure 1				
Measure 2				
Measure 3				

[1] Add rows for additional measures.

Non-energy Impacts

Document the non-energy impacts of the project such as impacts on O&M, water consumption etc. and the costs associated with those impacts.

Uncertainty

Discuss sources of uncertainty in energy use and demand reduction calculations other than metering error. Address assumption and potential impact of deviations in actual conditions from assumed conditions on energy savings. Discuss deviations from the original metering plan and quantify the impacts on the calculated savings.

Accuracy

The overall engineering accuracy of this analysis is: +/-_____ %

Signature of Energy Analyst

_____

Date of Submitted Report

_____

Appendix C – Documentation Summary Worksheet for Custom Projects

Appendix A							
Documentation Summary Worksheet for Custom Projects							
Instructions:							
1. Documentation is required for all sections and subsections shown in Columns A - C. Add rows as needed in order to completely document the project according to the requirements of the applicable Custom TRM and the Custom Analysis Template.							
2. Indicate by "X" in columns D & E whether the documentation applies to the Baseline, Efficient or Both cases.							
3. Indicate the measures to which the documentation applies in Column F, such as "M-1, M-2...". Use "P" for documentation that applies to the overall project.							
4. Indicate filenames of submitted documents in Column H. Include the measure number in the filename.							
5. Provide files listed in this table in electronic format with the project submission.							
Documentation Requirements			Case to which documentation applies		Measure(s) to which documentation applies	Description	Filename with Extension (.pdf, .xlsx, .inp, etc.)
Section	Category	Subcategory	Efficent	Baseline			
Section A - Project Information							
	Custom Analysis Template						
Section B - Measure Level							
	Reference Data and Studies						
		Applicable Codes or Standards					
		Case Studies and Industry Standards					
		Applicant Practice (Industrial Retrofit)					
	Equipment Specific Information						
		Manufacturer Performance Data					
		Nameplate Data					
		Operating Variables					
		Field Metered Load Data					
Section C - Metering and Data Collection							
	Metering Techniques						
	Calibration Logs (DDC)						
	Metering Datasets						
		Analyzed					
		Raw†					
		Cleaned†					
Section D - Energy and Demand Analysis							
	Analysis Files						
		Modeling Files					
		Calculations Spreadsheets					
	Savings						
		Savings Analysis Calculations					
		Savings Equations Source					
Section E - Additional Information							
	Project Costs						
	Non-Energy Impacts						
† Raw and Cleaned datasets are not typically required for savings claims. However, they should be available to Program Evaluation staff if requested.							

Appendix A							
Documentation Summary Worksheet for Custom Projects							
EXAMPLE:							
Documentation Requirements			Case to which documentation applies		Measure(s) to which documentation applies	Description	Filename with Extension (.pdf, .xls, .doc, .jpg other)
Section	Category	Subcategory	Efficient	Baseline			
Section A - Project Info							
	Custom Analysis Template				P	Template for Chiller project	CAT_Chiller_Date.doc
Section B - Measure Level							
	Reference Data and Studies						
		Applicable Federal Standards	x	x	M-1	ASHRAE 90.1-2004	ASHRAE90.1_M-1.pdf
		Applicable Local Codes	x	x	M-1	Vermont Guidelines 2005	VTG2005_pp10-15_M-1.pdf
		Case Studies and Industry Standards		x	P	ACEEE study	ACEE Study_Base_Eff.pdf
	Equipment Specific Information						
	Manufacturer Performance Data - Efficient Model		x		M-1, M-4	Cut sheet compressor efficiency and EWT performance; pump part load efficiency	MFR_M-1_EFF.pdf, MFR_M-4_EFF.pdf
	Manufacturer Performance Data - Baseline Model			x	M-1, M-4	Cut sheet compressor efficiency and EWT performance; pump part load efficiency	MFR_M-1_BASE.pdf, MFR_M-4_BASE.pdf
		Nameplate Data	x			Photo of installed nameplate	Efficient_Nameplate_M-1.jpg
		Operating Variables - schedule	x		P	Occupied and unoccupied operating schedules	Eff_sched_Base_Eff.doc
		Operating Variables - part load curves	x		M-1	Compressor part load curves	Part_Load_kW_M-1.pdf
		Field Metered Load Data	x	x	P	Compressor, condenser fans, EWT, pump speed field data	Field_Data_Baseline_and_Efficient.xls
Section C - Metering and Data Collection							
	Metering Techniques		x				
	Calibration Logs (DDC)		x				
	Metering Datasets						
		Raw	x	x	P	Baseline and efficient raw data: compressor, condenser fans, pump speed	RAW_base_eff.xls
		Cleaned	x	x	P	Baseline and efficient cleaned data: compressor, condenser fans, pump speed	CLEANED_base_eff.xls
		Analyzed	x	x	P	Data used in analysis: compressor, condenser fans, pump speed	ANALYZED_base_eff.xls
Section D - Energy and Demand Analysis							
	Analysis Files						
		Modeling Files	na	na	-	Analysis spreadsheets used in lieu of modeling software	
		Calculations Spreadsheets	x	x	P	Baseline and Analysis calculations (ref. TRM Section 2 equations)	baseline_calcs.xls, efficient_calcs.xls
	Savings						
		Savings Analysis Calculations	x	x	P	Savings calculations (ref. TRM Section 4 equations)	savings_calcs.xls
		Savings Equations Source	x	x	P	AEE study with equations	AEE_chiller_savings_equations.pdf
Section E - Additional Information							
	Project Costs		x		P	Invoices	Invoices.pdf
	Non-Energy Impacts		na	na		There were no non-energy impacts	

Appendix D – TRM Maintenance and Update Process

The Ohio Technical Reference Manual is designed to be a living document – it will benefit from an objective and thoughtful update process. Defining a process that coordinates with the needs of users, evaluators, and regulators is critical. Below we outline a process for the update of information and recommendations on the coordination of the timing of this process with other critical activities.

Proposed TRM Update Process

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. 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, they will need to be characterized and added to the manual. In addition, new program delivery design may result in the need for new measure characterization.
- 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 falls; or a new evaluation provides a better value of an assumption for a variable. In addition, as programs mature, characterizations need to be updated as changes in the market require changes in calculation assumptions. In such cases, these changes must be identified and appropriate changes 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 should be retired.

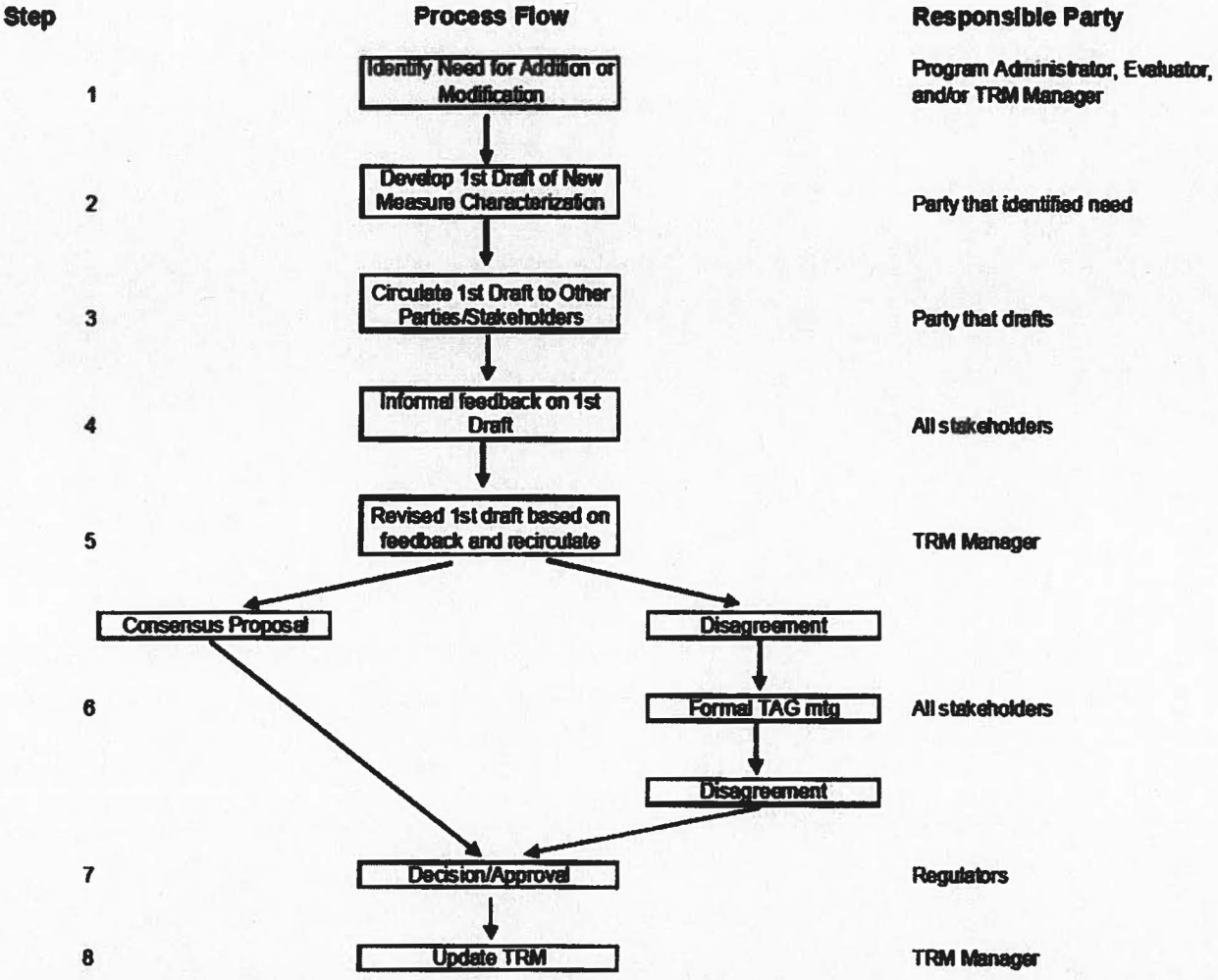
It is important to maintain a record of changes made to the TRM over time. It is therefore recommended to establish and maintain a Master Manual, containing all versions of each TRM in chronological order, and an abridged User Manual, in which only the current versions of active measures are included. Archiving older information in this fashion can be designed into the electronic interface (if developed), and only the current version of the User Manual is publically available on the site.

The flowchart presented below outlines steps that will result in effective review and quality control for TRM updates. One critical component is the establishment of a Technical Advisory Group (TAG) to provide a forum for discussing and resolving technical concerns.

This process requires a number of different roles to ensure effectiveness, sufficient review, and independence. The specific parties who will hold these roles in the Ohio TRM maintenance context will be clarified in discussion with the Commission. The following list of key responsibilities is given as a starting place for this conversation:

- Program administrators / utilities (consultants)
  - Identifies need for new or revised measure characterization – usually due to program changes or program/market feedback
  - Researches and develop first draft measure characterizations – for needs that the utilities identify
  - Develops second draft measure characterizations following feedback on first draft from all parties
  - Gives feedback on draft measure characterizations from other parties
  - Participates in Technical Advisory Group (TAG) for formal discussion and dispute resolution when needed
  - Gives input to regulators if TAG process does not resolve all issues

Flowchart for Proposed TRM Update Process



- Independent TRM Manager (Consultant)
  - Identifies need for revised measure characterization (usually based on knowledge of local or other relevant evaluation studies)
  - Researches and develops first draft measure characterizations – for needs identified either by itself or Evaluation consultant
  - Gives feedback on first draft measure characterizations from other parties
  - Develops second draft measure characterizations following feedback on first draft from all parties
  - Leads Technical Advisory Group (TAG) for formal discussion and dispute resolution when needed
  - Provides input to regulators if TAG process does not resolve all issues

- Makes recommendation for TRM revision to PUCO
- Manages and updates TRM manuals (after PUCO approval of changes)

- Third-party Evaluation consultant
  - Identifies need for revised measure characterization (usually based on local evaluation studies it has conducted or managed)
  - Input on draft measure characterizations developed by other parties
  - Participates in TAG meetings when appropriate
  - Performs program evaluation - includes 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
  - Verifies annual energy and capacity savings claims of each program and portfolio
  - Ensures proper utility use of TRM in annual savings verification process
- Commission staff
  - Hires and manages TRM and Evaluation consultant(s)
  - Approves any changes to TRM – includes serving as final arbiter in any disagreements between utilities and TRM consultant

The process outlined above also assumes that there are several potential stages of "give and take" on draft modifications to the TRM. At a minimum, there is at least one round of informal feedback and comment between the program administrators and the independent reviewer (TRM Manager or otherwise). Other parties could be invited to participate in this process as well. In the event that such informal discussions do not resolve all issues, the participants may find it beneficial to establish a Technical Advisory Group (TAG) to provide a more formal venue for resolution of technical disputes prior to any submission to the regulators. This group would include representation from the program administrators, the evaluators (when deemed useful), the TRM Manager, and Commission staff. The mission of such a group would be to discuss and reach agreement on any unresolved issues stemming from new measure proposals, savings verifications, or evaluations. They could also review and comment on the methodology and associated assumptions underlying measure savings calculations and provide an additional channel for transparency of information about the TRM and the savings assessment process.

Coordination with Other Savings Assessment Activities

As drafted, the Ohio Administrative Code requires the Commission/Staff to report whether an electric utility's or mercantile customer's actions match their proposed program portfolio; whether the utility's or mercantile customer's proposed program portfolio would produce actual savings; and whether actual savings were achieved. Although the TRM will be a critically important tool for both DSM planning and estimation of actual savings, it will not, by itself, ensure that reported savings are the same as actual savings. There are two principal reasons for this:

1. **The TRM itself does not ensure appropriate estimation of savings.** One of the responsibilities of the Independent Program Evaluator will be to assess that the TRM has been used appropriately in the calculation of savings.
2. **The TRM may have assumptions or protocols that new information suggests are outdated.** New information that could inform the reasonableness of TRM assumptions or protocols can surface at any time, but they are particularly common as local evaluations or annual savings verification processes are completed. Obviously, the TRM should be updated to reflect such new information. However, it is highly likely that some such adjustments will be made too late to affect the annual savings estimate of a utility or mercantile customer for the previous year, particularly given the PUCO's interim decision to not adjust savings estimates retroactively (TRM Entry Appendix A). Thus, there may be a difference between savings estimates in annual compliance reports and the "actual savings" that the PUCO may consider acceptable from a regulatory perspective. However, such updates should be captured in as timely a fashion as possible.

These two issues highlight the fact that the TRM needs to be integrated into a broader process that has two other key components: an annual savings verification process and on-going evaluation.

Savings verification ensures that information is being tracked accurately and in a manner consistent with the TRM. However, as important as it is, verification does not ensure that reported savings are "actual savings". TRMs are never and can never be perfect. Even when the verification process documents that assumptions have been appropriately applied, it can also highlight questions that warrant future analysis that may lead to changes to the TRM. Put another way, evaluation studies are and always will be necessary to identify changes that need to be made to the TRM. Therefore, in addition to annual savings verification processes, evaluations will periodically be made to assess or update the underlying assumption values for critical components of important measure characterizations.

In summary, there should be a strong, sometimes cyclical relationship between the TRM development and update process, annual compliance reports, savings verification processes, and evaluations. As such, we recommend coordinating these activities. A preliminary timeline established from such a coordinated process is given in the table below.

Annual Verification and TRM Update Timeline

<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">Utility</td><td colspan="2">Draft annual savings report</td><td colspan="3">No TRM submittal during SV</td><td></td><td colspan="6">Draft new or updated measure characterizations developed and submitted to TRM Manager; participate in TAG</td></tr>
<tr><td colspan="4"></td><td>SV response</td><td>Prior year data finalized</td><td colspan="6" rowspan="2">Technical Advisory Group (TAG) negotiations and evaluation</td></tr>
<tr><td rowspan="2">Evaluator</td><td></td><td></td><td colspan="3">Savings verification (SV)</td><td></td></tr>
<tr><td></td><td></td><td colspan="3">No TRM review during SV</td><td></td><td colspan="6">Refers need for TRM updates to TRM Manager; provides input on characterizations</td></tr>
<tr><td>TRM Manager</td><td></td><td></td><td colspan="3">No TRM during savings verification</td><td></td><td colspan="6">Propose/develop new or updated measure characterizations; review drafts provided by utilities; participate in TAG</td></tr>
<tr><td>PUCO</td><td></td><td></td><td></td><td></td><td></td><td>Make final savings determination</td><td colspan="6">Participate in TAG meetings; approve final TRM</td></tr>
</table>

In this example, it assumed that updates to the TRM occur only in the second half of the year. One option is to establish two specific update deadlines: one in September and the other at the end of December. The first would ensure that the best available data are available for utility planning for the following year. The second would ensure that best available assumptions are in place prior to the start of the new program year. In general, we would expect the number of additions or revisions in the September TRM update to be much greater than the number in December. Nevertheless, providing for two rounds of TRM review each year gives 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. The rationale for not updating the TRM during the first half of the year is that time is usually devoted, in part, to documenting, verifying and approving savings claims from the previous year. For example, the program administrator will likely require two months to produce its annual savings claim for the previous year. An independent reviewer will then require two to three months to review and probe that claim, with considerable back and forth between the two parties being very

common. Typically, final savings estimates for the previous year are not finalized and approved until mid-year. Program administrators and evaluators would be unlikely to have the time or focus for considering changes to measure characterizations during this time.

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

8/6/2010 2:53:28 PM

in

Case No(s). 09-0512-GE-UNC

Summary: Report Draft Energy Efficiency Technical Reference Manual. electronically filed by Mr. Paul A. Laurent on behalf of PUCO

STAFF-DR-01-029

REQUEST:

Refer to the Application, Exhibit I, page 13. Provide the source of the "primary data" referenced under the section titled "Description of measures and selection of methods by measure(s) or market(s)."

RESPONSE:

As stated in the footnote on page 13, "Rather than just using one value for HOU, we use before and after HOU values." The TRM is based on post-only hours, not allowing for Hours of Use (HOU) data before installation that may be different.

These HOU values used in Exhibit I come from the primary data collected from a previous study conducted for Duke Energy Carolinas. As stated on page 72 of Exhibit I, "Previous studies that have included both customer surveys and lighting loggers have shown that, comparing customers' self-reported hours of operation to the actual hours of operation, customers responding to the survey overestimated their lighting usage by about 27%. As this study did not employ lighting loggers, there is no data with which to make a comparison for this program specifically. Consequently, the self-reported hours of use obtained from the survey were reduced by the 27% established in the North Carolina and South Carolina Residential Smart $aver CFL Program report dated February 15, 2011."

PERSON RESPONSIBLE: Roshena Ham

STAFF-DR-01-030

REQUEST:

Refer to the Application, Exhibit I, page 21, regarding the recommendations by TecMarket.

a. Describe the steps Duke Kentucky has implemented to continually improve the Residential Smart Saver Energy Efficiency CFL program's marketing, delivery, and customer experience elements.

b. Explain how Duke Kentucky will monitor the CFL marketplace in order to remain proactive in its efforts to efficiently promote the adoption of CFLs in a prolific manner.

RESPONSE:

a. The Residential Smart Saver Energy Efficiency lighting programs (i.e. CFL and online Savings Store) are co-branded and utilize the same on-demand ordering platform on the public website. The on-demand platform allows eligible customers the opportunity to participate in both programs with ease and convenience improving the overall customer experience. Co-branding the programs through our marketing efforts provides more awareness for both programs and opportunities for customers to switch to energy efficiency lighting for all their lighting needs. Additionally, we recently launched a new marketing channel that allows eligible Duke Energy Kentucky customers calling into the IVR billing menu the opportunity to participate in the CFL program. Customers calling the IVR to make a payment, request a meter reading or who have general billing questions are intercepted with the CFL offer if they're eligible. Customer may choose to

participate and then continue in the IVR call flow and complete their original task. The public web site also includes videos and other educational tools to bring awareness and inform customers on how to save energy and money with energy efficiency lighting.

b. Duke Energy Kentucky will remain proactive and monitor the CFL marketplace by attending seminars and workshops (i.e. Energy Star, E Source etc.) and review market potential studies. Also, internal resources will allow to effectively market the lighting programs to eligible customers with updated propensity modeling and target marketing efforts to continue to drive participation in a cost effect manner.

PERSON RESPONSIBLE: Lari Granger

STAFF-DR-01-031

REQUEST:

Refer to the Application, Exhibit J, page 6. Provide the number of participants in the Residential Smart Saver HVAC Program for 2013 and year-to-date 2014.

RESPONSE:

	Participation
Jan. 1, 2013 – Dec. 31, 2013	**713**
Jan. 1, 2014 – Sept. 29, 2014	**449**

PERSON RESPONSIBLE: Nathan Cranford

Duke Energy Kentucky
Case No. 2014-00280
STAFF'S First Set of Data Requests
Date Received: September 29, 2014

STAFF-DR-01-032

REQUEST:

Refer to the Application, Exhibit J, page 6. The last bullet point that addresses Key Findings from the Management Interviews discusses the January 1, 2013 elimination of gas furnace rebates in Ohio, and customers' switching to gas furnaces due to cheaper perceived operating costs in Kentucky.

a. Describe the circumstances surrounding the program change in Duke Ohio's Residential Smart Saver HVAC Program, including the original program components as they relate to gas as compared to the current program components

b. Confirm that, according to page 12 of Exhibit J, the current Duke Kentucky Residential Smart Saver HVAC Program specifically excludes natural gas furnaces.

RESPONSE:

a. Until January 1, 2013 Duke Ohio's Residential Smart Saver HVAC Program incentivized residential customers for installing high efficiency gas furnaces achieving an annual fuel utilization efficiency (AFUE) rating of at least 90%. Duke Ohio discontinued the program due to the DOE's stated plan to increase the national efficiency standard beginning in 2013. Currently, the Duke Ohio Smart Saver HVAC Program incentivizes the same measures as the Duke Kentucky Smart Saver HVAC Program and does not include incentives for gas furnaces.

b. The Duke Kentucky Residential Smart Saver HVAC Program specifically excludes natural gas furnaces as is noted on page 12 of Exhibit J.

PERSON RESPONSIBLE: Nathan Cranford

Duke Energy Kentucky
Case No. 2014-00280
STAFF'S First Set of Data Requests
Date Received: September 29, 2014

STAFF-DR-01-033

REQUEST:

Explain whether Duke Kentucky has considered offering gas DSM programs to non-residential customers. If so, describe what programs were considered and explain why Duke Kentucky decided not to offer them. If not, explain why cost-effective non-residential DSM programs have not been considered.

RESPONSE:

In 2012, Duke Energy retained CLEAResult to analyze the feasibility of launching a portfolio of gas DSM programs in Duke Energy Kentucky and Duke Energy Ohio's combined service territories. A total of twenty-five (25) non-residential gas DSM programs were considered in the evaluation of establishing potential portfolio of gas programs. Programs included technologies such as, efficient boilers, duct sealing, food service equipment, efficient furnaces, space heaters, programmable thermostats and steam trap repair. While certain programs were cost effective, ultimately it was decided not to pursue the portfolio because of limited total impacts. Some of the specific underlying reasons for this conclusion were the following:

- Distribution avoided capital costs were very limited, thus burdening all rate payers with program costs but mostly only benefiting program participants.
- Program administration costs would be incurred to issue less than $60K of Kentucky non-residential incentives per year.

- Total non-residential annual gas impacts were forecast to be only 61 MMCF across the combined Ohio and Kentucky service territories.

PERSON RESPONSIBLE: Trisha Haemmerle

STAFF-DR-01-034

REQUEST:

Refer to the Application, Exhibit J, page 25, which states, "While Duke Energy retains the option to conduct its own quality assurance testing, the product manager has not felt the need to do so." Explain whether Duke Kentucky has performed any quality-assurance testing ("QA") in this program. If not, explain why not and whether Duke Kentucky plans to perform QA in the future.

RESPONSE:

At the time of the management interview Duke Kentucky had not performed any independent QA testing but had access to and periodically reviewed QA results and inspection notes, as well as having direct interaction with GoodCents inspectors as needed. This access and interaction provided appropriate and valuable insight into processes, results, and controls. As a part of larger contractual changes with GoodCents, Duke Kentucky insourced all QA testing as of April 2014 and will continue to perform QA testing for the foreseeable future.

PERSON RESPONSIBLE: Nathan Cranford

STAFF-DR-01-035

REQUEST:

Refer to the Application, Exhibit J, page 28, which states "[C]onsider separating the EMS fan requirement." Explain why this is a concern.

RESPONSE:

As stated on page 28 of Exhibit J, "Doing so would help to increase the installation of high efficiency heat pumps and air conditioners since it would eliminate lost opportunities where customers are willing to upgrade air conditioners or heat pumps, but not willing to pay to upgrade still functioning furnace blowers."

The ECM requirement as an absolute requirement may be limiting program participation. Removing the requirement may increase participation. If this requirement is removed, the program must still certify that the combination of the condensing unit and indoor coil without the ECM will meet the program SEER requirements through the submittal of AHRI certified efficiency documents.

PERSON RESPONSIBLE: Roshena Ham

STAFF-DR-01-036

REQUEST:

Refer to the Application, Exhibit J, page 36, which states, "Vectren gives and extra $20 for a programmable thermostat. That makes a difference. Duke should cover that too." Explain whether Duke Kentucky has considered an incentive for a programmable thermostat, and if so, what effect it would have on the cost-effectiveness of the program.

RESPONSE:

Duke Energy Ohio recently launched HōM Energy Manager in June 2014. This program provides the customer with a programmable thermostat. If the program is determined to be successful in Ohio, Duke Energy Kentucky will review the program with the Collaborative and decide if this program is cost effective for Kentucky.

PERSON RESPONSIBLE: Trisha Haemmerle

STAFF-DR-01-037

REQUEST:

Refer to the Application, Exhibit J, pages 36-37. Explain whether Duke Kentucky has ever partnered with the Kentucky Home Performance Program, and whether Duke Kentucky believes it would be a good trade ally in this program.

RESPONSE:

Duke Kentucky has supported the Kentucky Home Performance Program (KHP) in various ways since program inception, including being a "Utility Partner". Duke Kentucky believes that the mutual contractors, contractors participating in both the KHP and Smart Saver program, are the key to the programs integration. These mutual contractors have both programs and corresponding incentives and loan products at their disposal when speaking with potential customers about the benefits of making energy efficient decisions in their home resulting in increased sales and deeper penetration into the residential market. Duke Kentucky has made a concerted effort to ensure KHP contractors are aware and participating in the Smart Saver program.

PERSON RESPONSIBLE: Nathan Cranford

STAFF-DR-01-038

REQUEST:

Refer to the Application, Exhibit J, page 114, which states, "The net to gross ratio for the Residential Smart Saver HVAC program will be calculated and presented in the impact report." Provide the impact report, or its location in the Application.

RESPONSE:

The impact report has not been completed and is not available to be provided at this time.

PERSON RESPONSIBLE: Nathan Cranford

STAFF-DR-01-039

REQUEST:

Throughout Exhibit J of the Application there are references to the lack of incentives relating to gas furnaces. Exhibit B, page 2 of the Application shows an allocation of 63.5 percent of the cost of the Residential Smart Saver HVAC Program to gas. Since gas furnaces are not part of this HVAC program, explain what measures support the allocation of the costs of gas.

RESPONSE:

The Residential Smart $aver® Program offers customers a variety of energy conservation measures designed to increase energy efficiency in their homes. Some of the measures offered through this program include installation of high efficiency air conditioning (AC) and heat pump (HP) systems, performance of AC and HP tune-up maintenance services, implementation of attic insulation and air sealing services, implementation of duct sealing services. Measures such as these that improve the building envelope of the home will result in savings for electric and gas heating customers. For example, initial estimates for the attic and insulation and air sealing measure are 28.25 ccf per participant, and 21.6 ccf per participant for the duct sealing measure. Therefore there is an allocation of costs to gas customers.

PERSON RESPONSIBLE: Trisha Haemmerle

STAFF-DR-01-040

REQUEST:

Throughout Exhibit J there are various recommendations regarding the Residential Smart Saver HVAC Program. Identify the recommendations pertaining to Kentucky that Duke Kentucky is considering.

RESPONSE:

Duke Kentucky reviews and considers each recommendation provided via the evaluation process and will make program changes as appropriate. Responses to the recommendations identified throughout Exhibit J are contained in Attachment Staff DR-01-040.

PERSON RESPONSIBLE: Nathan Cranford

#	Recommendation	Program Management Response
1	Consider separating or eliminating the EMC fan requirement. Doing so would help to increase the installation of high efficiency heat pumps and air conditioners since it would eliminate lost opportunities where customers are willing to upgrade air conditioners or heat pumps, but not willing to pay to upgrade still functioning furnace blowers. This would be particularly helpful in areas where oil or natural gas-fired furnaces are prevalent.	Program management will evaluate the benefits and risks associated with the separation or elimination the ECM fan requirement and will make program changes as appropriate.
2	Consider test piloting a tiered rebate system whereby higher efficiency equipment garners higher financial incentives.	Program management will evaluate a tiered rebate system and make program changes as appropriate.
3	The GoodCents web portal provides online self-service tools that can reduce the number of trade allies phoning the call center, however trade ally adoption of the web portal appears low. Therefore we recommend increasing trade ally awareness of web portal and its features. We also encourage the installation and use of web tracking software, such as Google Analytics, to monitor its internet traffic.	Program management will continue to promote the web portal as appropriate and has begun monitoring web traffic on the site via Google Analytics.
4	Consider boosting residential customer awareness of the program via news stories, direct marketing and educational outreach at home shows and other events where homeowners congregate.	Program management will continue to leverage multiple marketing channels including those recommended as is deemed appropriate.
5	Monitor the newly implemented internet-based feedback system to provide additional insights directly from customers and trade allies as those survey results become available.	Program management will continue to provide each participant an opportunity to provide their program feedback via customer satisfaction surveys and will monitor the results making program adjustments as deemed appropriate.
6	Simplify the rebate application forms, or educate trade allies regarding which details on rebate applications are required, which are optional, and why requested information is necessary.	Program management will continue to evaluate the forms in detail and will develop and distribute supporting documents and/or training opportunities as deemed necessary.
7	In light of the fact that the serial numbers from the old units are difficult to obtain, consider eliminating that requirement, or at least marking that data field as optional.	Program management will continue to evaluate the forms in detail and will develop and distribute supporting documents and/or training opportunities as deemed necessary.
8	Consider using the customer's service address as the primary means of identification instead of the account number, since obtaining the account number leads to privacy concerns, clerical mistakes, and delays caused by customers not providing the required information.	Program management will continue to evaluate the forms in detail and will develop and distribute supporting documents and/or training opportunities as deemed necessary.
9	If AHRI numbers are required then provide an easier-to-use alternative to the AHRI website such as a chart or database that makes finding the requisite information easier to obtain.	Program management is currently exploring easier-to-use alternatives and will make changes as deemed appropriate.
10	Modify the layout of the printed forms to provide larger writing spaces for data entry.	Program management will continue to evaluate the forms in detail and will develop and distribute supporting documents and/or training opportunities as deemed necessary.
11	Allow extensions to the rebate application deadline upon request.	Program management will consider the recommendation and potential effects on program participation as well as other program attributes and operations and will make changes as deemed necessary.
12	Trade allies felt they were not given an opportunity to redress errors and rebate rejections prior to GoodCents sending notification letters directly to customers. Therefore, increase trade ally education about the current method for redressing errors and extend the response time for a trade ally return phone call before letters are mailed.	Program management will continue to communicate with trade allies in the most effective methods available and will continue to engage them to submit correct applications originally, make corrections or provide additional information in a timely manner while balancing customer engagement and communications.
13	Increase the information provided on the web portal regarding the information needed to approve rebate applications, and the estimated arrival date of rebate checks.	Program management will continue to communicate with and train trade allies regarding program requirements, forms, and processes. Additionally, program management is launching an updated version of the program website and will consider the recommended information during design.
14	Batch trade ally checks together and mail them in a single envelope.	Program management will consider the recommendation and make changes as deemed appropriate.
15	Educate trade allies about where they can download a digital PDF rebate application forms.	Program management will continue to communicate with and train trade allies regarding program requirements, forms, and processes. Additionally, program management is launching an updated version of the program website and will consider the recommended information during design.
16	Consider expanding rebate coverage to other technologies.	Duke Energy is constantly evaluating additional technologies and measures for incorporation into existing programs.
17	Simplification of the rebate application— or at least better explanations about what is required and why— may help to improve satisfaction among trade allies. It may also increase rebate levels since a small number of trade allies reported discontinuing their participation due to their dislike of the new paperwork.	Program management will continue to evaluate the forms in detail and will develop and distribute supporting documents and/or training opportunities as deemed necessary.
18	Consider increasing overall program energy savings by eliminating the indoor ECM motor requirement in favor of increased efficiency ratings on the new outdoor equipment.	Program management will evaluate the benefits and risks associated with the separation or elimination the ECM fan requirement and will make program changes as appropriate.
19	Alternately, consider separating the EMC fan requirement. Doing so would help to increase the installation of high efficiency heat pumps and air conditioners since it would eliminate lost opportunities where customers are willing to upgrade air conditioners or heat pumps, but not willing to pay to upgrade still functioning furnace blowers. This would be particularly helpful in areas where oil or natural gas-fired furnaces are prevalent.	Program management will evaluate the benefits and risks associated with the separation or elimination the ECM fan requirement and will make program changes as appropriate.
20	Another option for equipment and incentive changes includes the potential for a tiered rebate system whereby higher efficiency equipment garners higher financial incentives.	Program management will evaluate a tiered rebate system and make program changes as appropriate.
21	The nature of the HVAC marketplace is such that the effectiveness of the rebate amounts offered by the program is influenced by shifting economic conditions and the additional financial offsets of supplemental incentives offered by the federal government, manufacturers, other utilities, and the trade allies themselves. Therefore, TecMarket Works encourages close monitoring of this context in order to adjust rebate offerings as necessary to achieve program energy savings targets while maintaining overall cost effectiveness.	Program management will continue to monitor incentive levels and incentive structure and make program changes as appropriate.
22	The trade ally web portal provides participating HVAC contractors and dealers with a foundational set of tools that can not only simplify their interactions with the program, but also lower program administration costs by reducing the number of trade allies phoning the call center to check the status of rebates and eliminating the need to manually enter application data by using the online submission system. However, trade ally adoption levels of the web portal appear to be low. Therefore we recommend that GoodCents TARs widely promote use of the web portal among trade allies. We also encourage the installation and use of web tracking software, such as Google Analytics, in order to monitor internet traffic patterns and the volume of the trade allies visiting the website, since such insights may provide opportunities for further improvements.	Program management will continue to promote the web portal as appropriate and has begun monitoring web traffic on the site via Google Analytics.
23	Confusion regarding the erroneous need for trade allies to submit paid or signed customer invoices can be eliminated through increased clarification and communication about the specific requirements for program paperwork.	Program management has confirmed process alignment with GoodCents processing, paid invoices are not required. Copies of invoices are required and accepted from trade allies. Program management continues to communicate this message to the trade ally network via outreach personnel.

#	Recommendation	Program Management Response
24	While the program is designed to work directly with trade allies in order to provide the highest degree of influence at the point at which customers are making their purchasing decision, other opportunities for heightened awareness and interest are also possible. Therefore, Duke Energy may consider increasing its marketing and educational outreach to residential customers, either via direct marketing, at events where home owners congregate, such as home and garden shows, or through news stories or guest columns in print and digital media.	Program management will continue to leverage multiple marketing channels including those recommended as is deemed appropriate.
25	We also encourage the program management team to look to the newly implemented internet-based feedback system to provide additional insights directly from customers and trade allies as those survey results become available.	Program management will continue to provide each participant an opportunity to provide their program feedback via customer satisfaction surveys and will monitor the results making program adjustments as deemed appropriate.

STAFF-DR-01-041

REQUEST:

Refer to Exhibit K of the Application. Explain, by measure, the reason each measure is being proposed, and provide the associated estimated cost, incremental participation, and kWh/ccf/therm savings.

RESPONSE:

1. **MyHER Interactive:** This measure is being proposed to further engage MyHER customers in reducing their energy usage. In addition, some customers have opted out of the program because they would rather interact online or through email. There are no incremental costs of adding the MyHER Interactive portal as Duke negotiated a cost per participant regardless of which channel they chose to engage in. The incremental kWh savings is a 30% increase over the paper impacts. This increase was derived by analyzing various other portal programs throughout the country as well as a program run in Duke Energy Progress. The 30% increase is conservative. Duke estimates that in the first year 5% of the MyHER program participants will engage with the portal and 10% the following years.
2. **Smart Saver Residential:** Outdoor reflectors and candelabras are among the most common type of specialty bulbs in residential households. Providing LED technology for these applications will increase participation and allow customers to use energy efficient

lighting in areas where dimmers and timers are required and where CFLs do not perform well.

3. **Small Business Energy Saver (SBES):** The program measures will address major end-uses in lighting, refrigeration and HVAC applications commonly found within small business customer facilities. It is estimated that approximately 1,100 eligible customer accounts will participate in SBES over the five years of the program.

   All measures being proposed reflect the measure technologies and measure types currently offered by the SBES program in the Duke Energy Carolinas, Duke Energy Progress, and future Duke Energy Ohio service territories. The proposed measures types included within the Program are intended to be comprehensive and varied enough to serve the diverse small business market so that the program administrator has the capability to provide the vast majority of small business with a comprehensive energy efficiency solution. All lighting measures are required to be Consortium for Energy Efficiency (CEE), ENERGY STAR, or Design Lights Consortium (DLC) qualified products.

Program	Product	Measure Name	Total Program Costs	Incremental Participation	Total Projected kWh	Total Projected ccf	Type
MyHER Interactive	Online	My Home Energy Report - Interactive	$ -	1338	373,116	0	Residential
Residential Smart Saver	Lighting	Candelabra LED	$ 7,251	822	13,359	0	Residential
Residential Smart Saver	Lighting	Recessed Outdoor LED PAR38 Reflectors	$ 2,719	308	33,050	0	Residential
Small Business Energy Saver	HVAC	SBES HVAC_Air Conditioners	$ 2,431	6888	6,518	0	Non-Residential
Small Business Energy Saver	HVAC	SBES HVAC_Heat Pump	$ 2,431	6888	6,518	0	Non-Residential
Small Business Energy Saver	Lighting	SBES Lighting_ 8760 (Burn Hours)	$ 33,055	93672	88,644	0	Non-Residential
Small Business Energy Saver	Lighting	SBES Lighting_ Daylighting	$ 158,226	448384	419,267	0	Non-Residential
Small Business Energy Saver	Lighting	SBES Lighting_ DusktoDawn	$ 22,604	64055	60,658	0	Non-Residential
Small Business Energy Saver	Lighting	SBES Occupancy Sensors	$ 9,722	27551	25,761	0	Non-Residential
Small Business Energy Saver	Refrigeration	SBES Refrigeration	$ 14,583	41326	39,108	0	Non-Residential

PERSON RESPONSIBLE:

1. **MyHER Interactive: Kelly Griffin**
2. **Smart Saver Residential: Lari Granger**
3. **Small Business Energy Saver: Nathan Lewis**