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David S. Samford
(859) 368-7740

September 14, 2015

VIA HAND DELIVERY

Mr. Jeff Derouen
Executive Director
Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40602

RE: *In the Matter of the 2015 Integrated Resource Plan of East Kentucky Power Cooperative, Inc., Case No. 2015-00134*

Dear Mr. Derouen:

Please find enclosed for filing with the Commission, in the above referenced case, an original and ten redacted copies of East Kentucky Power Cooperative, Inc.'s ("EKPC") Responses to Commission Staff's Supplemental Request for Information.

Also enclosed are an original and ten copies of EKPC's Motion for Confidential Treatment ("Motion"). One copy of the designated confidential portions of the filing is enclosed in a sealed envelope.

Please return a file-stamped copy of these filings to my office.

Very truly yours,

David S. Samford

Enclosures

Cc: Parties of Record

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

RECEIVED
SEP 14 2015
PUBLIC SERVICE COMMISSION

In the Matter of:

2015 INTEGRATED RESOURCE PLAN OF EAST KENTUCKY POWER COOPERATIVE, INC.	) CASE NO.) 2015-00134

MOTION FOR CONFIDENTIAL TREATMENT

Comes now East Kentucky Power Cooperative, Inc. ("EKPC"), by and through counsel, pursuant to KRS 61.878, 807 KAR 5:001, Section 13 and other applicable law, and for its motion requesting that the Kentucky Public Service Commission ("Commission") afford confidential treatment to a portion of the responses to the Commission's supplemental requests for information, respectfully states as follows:

1. EKPC filed its 2015 Integrated Resource Plan ("IRP") on April 21, 2015, pursuant to 807 KAR 5:058.

2. On August 28, 2015, Commission Staff propounded supplemental requests for information upon EKPC in this matter. Contemporaneously with this Motion, EKPC is filing responses to Commission Staff's supplemental requests for information.

3. In response to Item 6 of Commission Staff's supplemental requests for information, EKPC is filing the KEMA Assessment of Evaluation, Measurement and Verification for DSM programs ("KEMA Report"). EKPC is seeking confidential protection of portions of the KEMA Report.

4. Specifically, EKPC is requesting confidential treatment for information pertaining to project budgets, the names of particular employees who have roles in the administration of the

DSM programs being discussed and EKPC's internal DSM program work flow and business processes, which are illustrated on an organizational chart. The employees' names and work assignments, the budget information and the work flow and business process illustrations (collectively, the "Confidential Information") would, if publicly disclosed, permit an unfair commercial advantage to third parties or present an unnecessary and unreasonable infringement upon EKPC's employees' privacy concerns. The Confidential Information for which EKPC is seeking confidential protection is located in: (1) Table 1-3 on page 1-9 and Table 8-2 on page 8-9 of the KEMA Report which contain DSM budgets; (2) Section 3.2.3 Evaluation Data Collection Process on page 3-6 which contains the employees' names; (3) Figure 8-1, EKPC Current Staff Allocation (Hours/FTEs) Spent on EM&V on page 8-2 of the KEMA Report; and (4) Figure 8-2, EKPC DSM Organizational Structure, which also contains EKPC's DSM work flow and business process illustration, contained on page 8-3 of the KEMA Report.

5. The Kentucky Open Records Act, and specifically KRS 61.878(1)(c)(1), protects "records confidentially disclosed to an agency or required by an agency to be disclosed to it, generally recognized as confidential or proprietary, which if openly disclosed would permit an unfair commercial advantage to competitors of the entity that disclosed the records." Moreover, the Kentucky Supreme Court has stated, "information concerning the inner workings of a corporation is 'generally accepted as confidential or proprietary.'" *Hoy v. Kentucky Industrial Revitalization* Authority, 907 S.W.2d 766, 768 (Ky. 1995). If disclosed, the Confidential Information within the KEMA Report would give market participants and competitors insights into the business operations and strategies and personnel assignments of EKPC that are otherwise publicly unavailable. Accordingly, the Confidential Information satisfies both the statutory and common law standards for affording confidential treatment.

6. The Confidential Information consists of proprietary information that is retained by EKPC on a "need-to-know" basis. The Confidential Information is distributed within EKPC only to those employees who must have access for business reasons, and is generally recognized as confidential and proprietary in the energy industry.

7. EKPC does not object to limited disclosure of the Confidential Information, pursuant to an acceptable confidentiality and nondisclosure agreement, to intervenors with a legitimate interest in reviewing same for the sole purpose of participating in this case. EKPC reserves the right to object to providing the Confidential Information to any intervenor if said provision could result in liability to EKPC under any Confidentiality Agreement or Non-Disclosure Agreement.

8. In accordance with the provisions of 807 KAR 5:001, Section 13(2), EKPC is filing separately under seal one (1) unredacted copy of the KEMA Report with the Confidential Information highlighted or otherwise appropriately denoted. EKPC is also filing ten (10) copies of the KEMA Report with the Confidential Information redacted or removed.

9. In accordance with the provisions of 807 KAR 5:001, Section 13(2), EKPC respectfully requests that the Confidential Information be withheld from public disclosure for ten (10) years.

10. If, and to the extent, the Confidential Information becomes publicly available or otherwise no longer warrants confidential treatment, EKPC will notify the Commission and have its confidential status removed, pursuant to 807 KAR 5:001 Section 13(10).

WHEREFORE, on the basis of the foregoing, EKPC respectfully requests that the Commission classify and protect as confidential the Confidential Information described herein for a period of ten (10) years.

This 14th day of September, 2015.

Respectfully submitted,

Mark David Goss
David S. Samford
GOSS SAMFORD, PLLC
2365 Harrodsburg Road, Suite B-235
Lexington, KY 40504
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Counsel for East Kentucky Power Cooperative, Inc.

CERTIFICATE OF SERVICE

This is to certify that a true and correct copy of the foregoing was deposited in the custody and care of the U.S. Mail, postage prepaid, on this the 14th day of September, 2015, addressed to the following:

Gregory Dutton
Stephanie J. Kingsley
Assistant Attorneys General
1024 Capital Center Drive, Suite 200
Frankfort, KY 40601-8204

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36 East Seventh Street, Suite 1510
Cincinnati, Ohio 45202

Counsel for East Kentucky Power Cooperative, Inc.

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

2015 INTEGRATED RESOURCE PLAN OF EAST KENTUCKY POWER COOPERATIVE, INC.	**) CASE NO.) 2015-00134**

RESPONSES TO COMMISSION STAFF'S SUPPLEMENTAL REQUEST FOR INFORMATION TO EAST KENTUCKY POWER COOPERATIVE, INC. DATED AUGUST 28, 2015

EAST KENTUCKY POWER COOPERATIVE, INC.

PSC CASE NO. 2015-00134

COMMISSION STAFF'S SUPPLEMENTAL REQUEST INFORMATION DATED 08/28/15

East Kentucky Power Cooperative, Inc. ("EKPC") hereby submits responses to the information requests of Public Service Commission Staff's ("PSC") in this case dated August 28, 2015. Each response with its associated supportive reference materials is individually tabbed.

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

2015 INTEGRATED RESOURCE PLAN OF EAST KENTUCKY POWER COOPERATIVE, INC.	))	**CASE NO. 2015-00134**

CERTIFICATE

STATE OF KENTUCKY)
)
COUNTY OF CLARK)

Jeffrey M. Brandt, being duly sworn, states that he has supervised the preparation of the responses of East Kentucky Power Cooperative, Inc. to the Public Service Commission Staff's Supplemental Request for Information in the above-referenced case dated August 28, 2015, and that the matters and things set forth therein are true and accurate to the best of his knowledge, information and belief, formed after reasonable inquiry.

Subscribed and sworn before me on this 14th day of September, 2015.

Notary Public #500144

GWYN M. WILLOUGHBY
Notary Public
State at Large
Kentucky
My Commission Expires Nov 30, 2017

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

2015 INTEGRATED RESOURCE PLAN OF EAST KENTUCKY POWER COOPERATIVE, INC.	))	**CASE NO. 2015-00134**

CERTIFICATE

STATE OF KENTUCKY)
)
COUNTY OF CLARK)

Scott Drake, being duly sworn, states that he has supervised the preparation of the responses of East Kentucky Power Cooperative, Inc. to the Public Service Commission Staff's Supplemental Request for Information in the above-referenced case dated August 28, 2015, and that the matters and things set forth therein are true and accurate to the best of his knowledge, information and belief, formed after reasonable inquiry.

Scott Drake

Subscribed and sworn before me on this 14th day of September, 2015.

Gwyn M Willoughby #588144
Notary Public

GWYN M. WILLOUGHBY
Notary Public
State at Large
Kentucky
My Commission Expires Nov 30, 2017

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

2015 INTEGRATED RESOURCE PLAN OF EAST KENTUCKY POWER COOPERATIVE, INC.	))	**CASE NO. 2015-00134**

CERTIFICATE

STATE OF KENTUCKY)
)
COUNTY OF CLARK)

Craig A. Johnson, being duly sworn, states that he has supervised the preparation of the responses of East Kentucky Power Cooperative, Inc. to the Public Service Commission Staff's Supplemental Request for Information in the above-referenced case dated August 28, 2015, and that the matters and things set forth therein are true and accurate to the best of his knowledge, information and belief, formed after reasonable inquiry.

Craig A. Johnson

Subscribed and sworn before me on this 14th day of September, 2015.

Gwyn M. Willoughby #500144
Notary Public

GWYN M. WILLOUGHBY
Notary Public
State at Large
Kentucky
My Commission Expires Nov 30, 2017

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

2015 INTEGRATED RESOURCE PLAN OF EAST KENTUCKY POWER COOPERATIVE, INC.	))	**CASE NO. 2015-00134**

CERTIFICATE

STATE OF KENTUCKY)
)
COUNTY OF CLARK)

Jerry Purvis, being duly sworn, states that he has supervised the preparation of the responses of East Kentucky Power Cooperative, Inc. to the Public Service Commission Staff's Supplemental Request for Information in the above-referenced case dated August 28, 2015, and that the matters and things set forth therein are true and accurate to the best of his knowledge, information and belief, formed after reasonable inquiry.

Jerry Purvis

Subscribed and sworn before me on this 14th day of September, 2015.

Gwyn M. Willoughby #508144
Notary Public

GWYN M. WILLOUGHBY
Notary Public
State at Large
Kentucky
My Commission Expires Nov 30, 2017

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

2015 INTEGRATED RESOURCE PLAN OF EAST KENTUCKY POWER COOPERATIVE, INC.	))	**CASE NO. 2015-00134**

CERTIFICATE

STATE OF KENTUCKY)
)
COUNTY OF CLARK)

Julia J. Tucker, being duly sworn, states that she has supervised the preparation of the responses of East Kentucky Power Cooperative, Inc. to the Public Service Commission Staff's Supplemental Request for Information in the above-referenced case dated August 28, 2015, and that the matters and things set forth therein are true and accurate to the best of her knowledge, information and belief, formed after reasonable inquiry.

Julia J. Tucker

Subscribed and sworn before me on this 14th day of September, 2015.

Gwyn M. Willoughby #520144
Notary Public

GWYN M. WILLOUGHBY
Notary Public
State at Large
Kentucky
My Commission Expires Nov 30, 2017

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL REQUEST FOR INFORMATION RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL REQUEST FOR INFORMATION DATED 08/28/15
REQUEST 1
RESPONSIBLE PERSON: **Craig A. Johnson**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 1. Refer to EKPC's Integrated Resource Plan ("IRP"), page 81, Table 8.(3)(b)(1-11)-1. For each unit that is retired or is to be retired in the near future other than Dale Station Units 3 and 4, describe in detail EKPC's plans for the physical assets and facilities once those units are retired.

Response 1. Because Dale Station will not be able to economically meet MATS, EKPC's Board of Directors determined that the only prudent course of action available was to cease all generation activities at the facility. EKPC's plan for Units 1 and 2 is to decommission the facilities and possibly partially disassemble the Units in order to recover any marketable parts for sale to prospective purchasers. The decision to demolish the facility will be made in the future. The transmission assets will remain intact. EKPC will retain ownership of the site.

The Mason County Landfill Gas to Energy plant ("LFGTE") has been fully decommissioned. On February 2, 2015, EKPC gave notice to the Mason County Fiscal Court and the City of Maysville that it was terminating the agreements associated with the LFGTE. The one unit station had not produced any electricity since early 2012 due to a lack of gas supply. The major assets will be utilized in other LFGTE projects, like the expansion of the Bavarian LFGTE that is the subject of Case No. 2015-00284. The structure that housed the equipment has become the property of the Mason County Fiscal Court, thus saving EKPC the expense of demolishing the structure.

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL REQUEST FOR INFORMATION RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL REQUEST FOR INFORMATION DATED 08/28/15
REQUEST 2
RESPONSIBLE PERSON: **Jerry B. Purvis**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 2. Refer to EKPC's IRP, page 202, where it states, "An additional one-year extension beyond April 2016 may be feasible if a federal compliance order is obtained." State the actions, if any, has EKPC taken or will take with respect to the one-year extension?

Response 2. Pursuant to 40 CFR Part 63, Subpart UUUUU, Mercury Air Toxics Rule, EKPC could request one additional year from EPA Office of Enforcement and Compliance Assurance, however, at this time there exists no identifiable reason to do so. In addition, EKPC is beyond the applicable rule time limit to do so.

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL REQUEST FOR INFORMATION RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL REQUEST FOR INFORMATION DATED 08/28/15
REQUEST 3
RESPONSIBLE PERSON: **Scott Drake**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 3. Refer to EKPC's IRP, Technical Appendix, Volume 2, Exhibit DSM-9, regarding the Demand-Side Management and Renewable Energy Collaborative ("Collaborative").

Request 3a. Explain whether an annual report for the Collaborative for 2014 has been filed with the Commission. If not, explain whether and when an annual report will be filed for 2014.

Response 3a. The original Collaborative charter established the Collaborative as a two (2) year collaboration of work ending in 2013. Therefore, no work was accomplished in 2014 and no annual report will be filed.

Request 3b. Provide an update of the Collaborative's activities, including its plans for the future.

Response 3b. EKPC has established a new Collaborative constituted mostly of the same stakeholders as the original Collaborative that ended in 2013. The new Collaborative, entitled "Collaborative 2.0", will conduct its first meeting September 29, 2015, in Lexington, KY. EKPC mailed to the Commission an invitation to participate in the new Collaborative.

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL REQUEST FOR INFORMATION RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL REQUEST FOR INFORMATION DATED 08/28/15
REQUEST 4
RESPONSIBLE PERSON: **Julia J. Tucker**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 4. Refer to EKPC's response Commission Staff's First Request for Information ("Staff's First Request"), Item 4. Provide a general description of the impacts the proposed purchase from Bluegrass Generation Company, LLC ("Bluegrass"), if approved, will have on the assumptions and conclusions contained in EKPC's 2015 IRP, particularly as they relate to capacity additions and reserves.

Response 4. On page 5 of the IRP, under the recommended plan of action, the third bullet states that EKPC will continuously compare PPA costs against other power supply alternatives identified in the RFP process. The addition of the Bluegrass units to the EKPC fleet is a direct result of this plan of action. The 400 MWs of PPAs recommended in the expansion plan will be replaced with the Bluegrass units.

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL REQUEST FOR INFORMATION RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL REQUEST FOR INFORMATION DATED 08/28/15
REQUEST 5
RESPONSIBLE PERSON: **Scott Drake**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 5. Refer to EKPC's response to Staff's First Request, Item 7. Describe what actions EKPC and its 16 member distribution cooperatives ("Member Cooperatives") have taken to standardize demand-side management ("DSM") and energy-efficiency programs' names and promotional information in order to minimize advertising, promotion and marketing expenses.

Response 5. The DSM Steering Committee consisting of members from the 16 Member Cooperatives and EKPC's staff strives to develop programs that all Member Cooperatives can implement for their retail members without changes to the individual program structure or names. That consistency is reinforced by EKPC developing and producing DSM marketing and advertising materials for all 16 Member Cooperatives.

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL REQUEST FOR INFORMATION RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL REQUEST FOR INFORMATION DATED 08/28/15
REQUEST 6
RESPONSIBLE PERSON: **Scott Drake**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 6. Refer to EKPC's response to Staff's First Request, Item 8, regarding KEMA's Assessment of Evaluation, Measurement and Verification ("EM&V") for DSM programs. Provide a copy of KEMA's Assessment of EM&V report.

Response 6. A copy of KEMA's Assessment of EM&V report is attached as pages 2 through 103 of this response. Please note that certain portions of the report are the subject of a motion for confidential treatment.

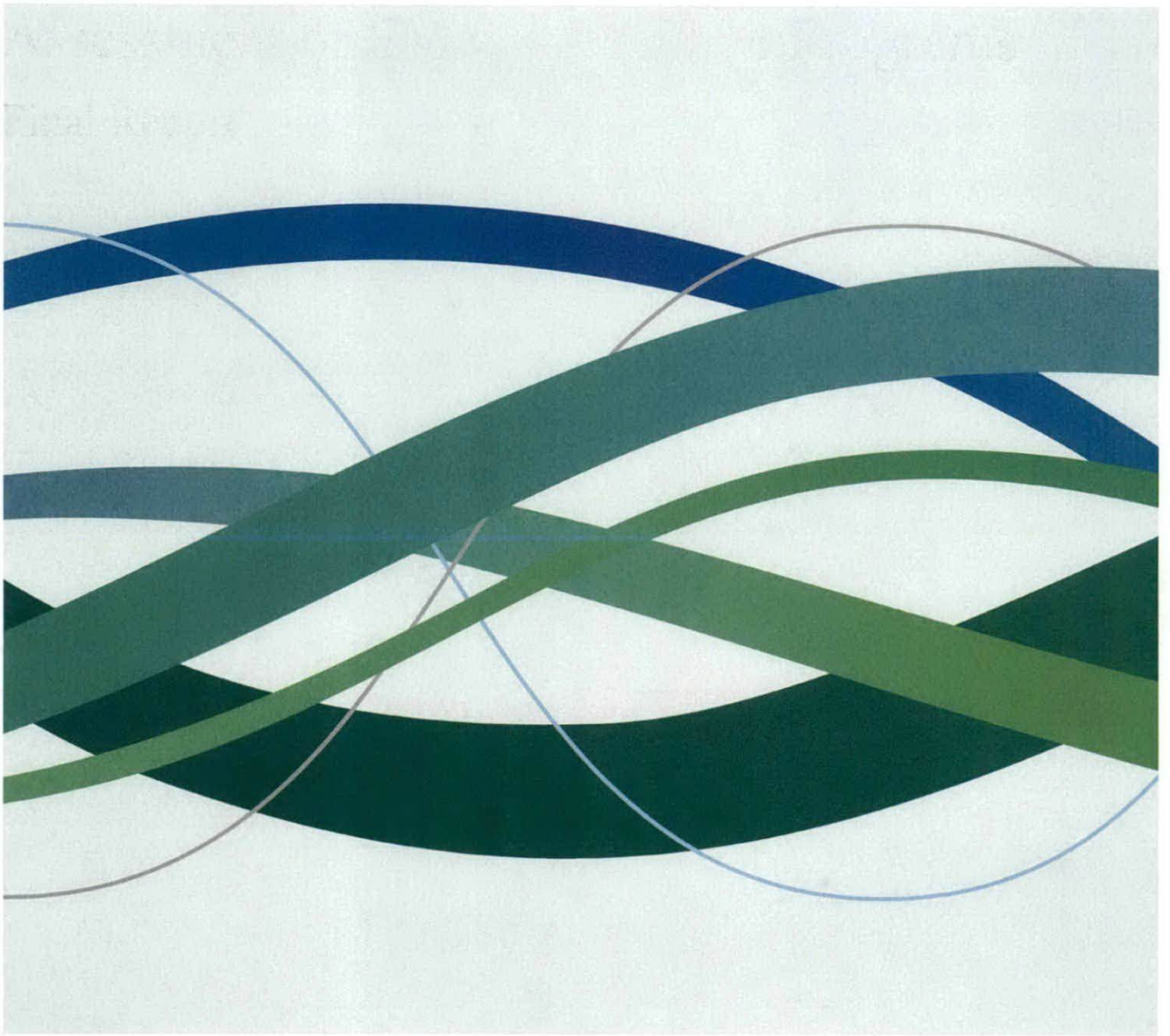
Assessment of EM&V for DSM Programs

Final Report

East Kentucky Power Cooperative

Prepared by KEMA, Inc.

February 7, 2013



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1. Executive Summary

East Kentucky Power Cooperative (EKPC) offers a portfolio of Demand Side Management (DSM) programs to its sixteen Owner-Members for delivery to their residential, commercial and industrial members. The energy efficiency (EE) and demand response (DR) programs are evaluated for the purposes of determining impacts on the system load forecast and in Power Supply Planning. EKPC desires to enhance their current program evaluation procedures to a more rigorous Evaluation, Measurement and Verification (EM&V) process that will better position them for potential future regulatory and market scenarios in which they may be required to engage.

In this study, the DNV KEMA project team reviewed EKPC's current methods, capacity and potential future requirements for EM&V. As part of that process, we reviewed the existing EM&V resources and organizational structure at EKPC, created a new organization/staffing plan, investigated the needs of Owner-Members, and reviewed current EM&V data collection, availability and gaps. The objective of this study is to provide EKPC with a set of EM&V protocols that can be applied under five potential future scenarios. These include:

- Two regulatory scenarios; and
- Three scenarios associated with participation in the PJM capacity market.

In addition to these scenarios, DNV KEMA also considered the following:

- One business-as-usual scenario under which EKPC would maintain the evaluation effort as currently implemented, with minor changes in organizational structure and reporting requirements;
- One task for the value obtained from implementing a baseline study to provide enhanced information from which to estimate program impacts; and
- One task showing the development (or acquisition) of a Program Tracking System to support the enhanced EM&V processes under all of the scenarios described above.

1.1 Findings

EKPC's current evaluation process has generally followed minimum industry standard practices for estimating the impacts of its EE programs. The process is sound and adequately robust for the purposes for which the results have been used to date. The evaluation process has focused exclusively on

determining quantitative program impacts. To date, there has been little effort put into examining market effects or program processes. These evaluations have used standard engineering algorithms appropriate to each program type, based on reported, but unverified, participation data from the Owner-Members, and applying deemed energy savings values on per unit energy savings by measure. In a few cases, field measurements are used to augment the analyses, and building simulation modeling is used for whole building savings estimation. For Direct Load Control programs, the company has relied upon data reported by the implementation contractor for estimating peak demand reductions.

From our review of the exiting evaluation process, DNV KEMA found the methodologies that have been used to date for estimating impacts to be adequate and consistent with industry practice. However much of the data that is collected and available is not being used in the calculations. Instead, the evaluations are based upon deemed savings values from Technical Resource Manuals and other industry sources. While this is an acceptable approach, it seems that a better opportunity is being missed by not taking full advantage of valuable information that is collected in the field. Detailed customer level data are being collected by Energy Advisors, and is being reported into the EKPC Crystal Reports database, according to staff interviews. However, this is where it stops as the only use currently being made of the data is for transfer payment purposes. Only a few fields of the Crystal Reports database have to be queried in order to complete the transfer payment process, so most of the data goes unused. The evaluation relies on only limited fields provided to them by Member Services, the group that manages the DSM database (Crystal Reports), primarily counts of customers and measures installed.

The implications of this finding are all good:

1. EKPC already has a good system in place for collecting significant amounts of detailed data per customer that is highly useful for evaluation purposes

2. There are very few gaps in the types of data being collected across the programs that would be needed for enhanced evaluation purposes

3. EKPC is already conducting 100% site inspections as part of the program delivery process (due to low participation rates to date and fairly manageable schedules)

4. Since a process is already in place for collecting most of the data necessary for enhanced evaluation, all that is needed is to provide access to that data to evaluators.

The current DSM database is the current responsibility of Member Services, who use it for transfer payment processing. The system is managed and maintained by IT. A Marketing Representative provides summary reports to other EKPC groups (e.g., Load Forecasting, Power Supply Planning and

Management) as needed, but do not provide direct access to the database. Transferring responsibility for or opening access to the DSM database should be a relatively easy process to complete, with appropriate controls and cell protections, such that those with the technical skills necessary for conducting evaluation and analysis will be able to directly manage and use the data that they need.

1.2 Recommendations

DNV KEMA makes the following recommendations for EKPC to enhance its EM&V function and processes. These recommendations are based upon the data collected and analyzed for this project, as well as a regulatory review and peer review of similar EM&V activities around the US.

An overriding issue to be addressed related to both EM&V enhancements and PJM market participation is the fact that the programs have achieved limited participation levels to date. As EKPC considers the recommendations below, there is an immediate need to better understand how to achieve higher levels of participation in the existing portfolio. By focusing on the implementation challenges (including regulatory issues, engagement of Owner-Members and capacity building), EKPC will achieve higher levels of energy savings and demand response to evaluate and offer into the PJM market. While this study touched upon some of underlying barriers to success, EKPC would be well served to conduct a more targeted Process Evaluation in 2013 as a precursor to or in parallel with launching the recommendations below.

DNV KEMA's recommendation regarding enhancements to meet requirements under potential future regulatory and market scenarios are as follows:

1. **Conduct annual Process and Impact Evaluations, starting with a targeted Process Evaluation in 2013** to better understand barriers to increased program activity levels on the part of Owner-Members and their customers. The rest of the recommendations assume a robust DSM portfolio with higher participation levels than currently experienced, and consistent with the 5-Year Plan.

   Establish a dedicated DSM Planning and Evaluation group or FT individual, lead by an evaluation, economics or engineering expert that will have responsibility for maintaining the DSM Database (or tracking system if one is adopted), conducting and/or managing program evaluations, producing evaluation reports, providing program status reports to Member Services for processing of transfer payments, and conducting/managing the execution of supporting research for program improvement. Skill sets required include benefit-cost and economic

analysis, market research and survey statistical analysis, and ideally load research analysis. Staff should undergo specific training in the evaluation of DSM programs.

2. **Have the DSM Planning & Evaluation group be part of the Power Supply Planning** organization to provide necessary separation from those who are responsible for implementing the programs. This is where the analytical skill sets necessary for evaluation reside.

3. **Create a DSM Implementation group with 2 to 3 distinct positions reporting to a dedicated Director of DSM** (now one function within Corporate Technical Services) to manage the residential, commercial/industrial and demand response programs. This group should be responsible for all communications regarding the programs with Owner-Members and vendors but should coordinate with Member Services. Since EKPC is considering DSM as a resource going forward, the delivery group should have goals accountable to the Power Supply Planning organization. Staff will require a combination of technical knowledge (such as facilities engineering, residential construction, etc.), contract management skills and strong Member Services (to interact with the Owner-Members).

4. **Develop a Program Tracking System for ensuring the proper collection and management of program data** to support the EM&V process, as well as reporting and effective program management. Improve the current DSM database by moving into a relational database format. Transfer responsibility of the database to the group that will use it the most, i.e., the new DSM Planning and Evaluation team. Most implementation vendors provide their own proprietary tracking systems as part of their services, but there are an increasing number of vendors that provide tracking system design as a separate service.

5. **Conduct a Data Tracking System review as part of first year evaluation activities.** Start by first reviewing the amount and quality of customer-level documentation being collected and maintained by Owner-Members and EKPC in support of the claimed program activity levels. Modify the data collection forms and processes to ensure capture of all necessary EM&V data and backup documentation.

6. **Retain responsibility for Owner-Member transfer payments with Marketing/Member Services**, using data provided by DSM Power Supply Planning. There is no need to alter an established relationship and expectation of who delivers the payments.

7. **Calibrate the estimated savings from the current deemed savings approach to actual measurements of consumption** (e.g. billing data) and demand (e.g. metering). Revise the estimated savings each time program evaluation results provide a more accurate number.

8. **Implement a process for verifying savings through on-site inspections and measurements** of a percentage of jobs, providing quality assurance checks on the program processes. Ten percent is industry standard, with less frequency if no problems are found.

9. **Conduct an analysis of the monthly customer billing data** on the program with the most savings to date.

10. **Create and provide access to a program dashboard for Owner-Members** to gauge their performance and to use results in marketing the programs as part of the new DSM Program Tracking System.

11. **Have dedicated staff participate in industry training in EM&V methods**. Several organizations offer training including the Association of Energy Engineers and the Association of Energy Services Professionals.

12. **Conduct a Baseline Study to enhance the Member Survey** on housing and appliance by capturing equipment efficiency characteristics, customer attitudes, behaviors and preferences for energy efficiency actions to be used for comparison against program participation activity going forward, and for improved program planning.

A suggested timeline for considering these recommendations is presented in Table 1-1 below. In this timeline we present quarterly detail for first year EM&V activities that are prioritized around Scenario 3 (for February filing), and implementation of incremental steps toward a more rigorous EM&V function over the next 18 months.

Table 1-1: Suggested Timeline to Implement Project Team Recommendations

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	2014	2015	2016	2017
1	Create DSM Planning and Evaluation Group under System Planning								
2	Creat DSM Implementation Group - with dedicated Director of DSM								
3	Create dedicated Residential, C&I and DR program managers in the DSM Implementation Group								
4	Conduct DSM data tracking system review including collection of customer-level documentation								
5	Design & implement new DSM tracking system, revise program input sheets, train coops & vendors on data needs				ongoing maintainenance and upgrades				
6	Conduct annual process and impact evaluations, provide input to Load Forecast, IRP processes, regulatory affairs		(Process in early 2013)						
7	Transfer payment function stays with Member Services using EM&V data								
8	Conduct baseline survey of residential customers (every 3 years)								
9	Conduct baseline survey of C&I customers (every 3 years)								
10	Set up billing data transfer protocols								
11	Prepare PJM Filings	For Sce. 3			For other Scenarios				
12	Review on-site inspection processes for adequacy to meet EM&V Scenario requirements	For Sce. 3				For other Scenarios			
13	Launch Member DSM Dashboard as part of DSM Program Tracking System								
14	Attend EM&V training at industry forums								

1.3 EM&V Framework and Protocols

The majority of this report is devoted to describing a set of detailed EM&V Protocols for determining the impact of EKPC's suite of existing DSM programs. The EM&V Protocols are organized around contemporary methods as depicted in various nationally-recognized guidelines in use today, and supported by regulatory and market leaders for the measurement of energy savings and demand reductions.

The protocols are presented in an EM&V Framework, depicted in Table 1-2, that identifies the appropriate Protocol to be applied to each DSM program currently being implemented by EKPC. A key is provided to the various abbreviations for the Protocols in Table 1-2.

In the EM&V Framework, EKPC's current practice is noted with a red X. DNV KEMA's recommended enhanced EM&V approaches are indicated by Protocol abbreviations in dark blue.

Table 1-2: EKPC Program Evaluation: Current Practices and Recommended Protocols

	Current Practice and Recommended Protocols					
EKPC DSM Program Evaluation Approach	End-use metering studies	Whole facility metering	Statistical billing analyses of utility consumption data	Development and use of engineering algorithms	Building energy simulation modeling	Deemed savings calculation
Current Practice = X, Recommended Method*		None of the programs currently have whole facility metering	None of the programs currently have whole facility metering			
RESIDENTIAL EE PROGRAMS						
Residential Weatherization						
Button Up Weatherization Program		RWB	RWB	X		X
Button Up with Air Sealing		RWB	RWB	X		X
Residential HVAC Equipment						
HVAC Duct Sealing Program		RWB	RWB	X		X
Heat Pump Retrofit Program	RAL (1)	RWB	RWB	X		X
Residential New Construction						
TSE Home		RNC			X	X
TSE Manufactured Home Heat Pump Retrofit	CIE (1)	RNC	RNC			X
Advance Lighting Program LED (Unit = 1 bulb)	RAL			X		X
COMMERCIAL EE PROGRAMS						
Commercial Advanced Lighting	CIE			X		
INDUSTRIAL EE PROGRAMS						
Compressed Air	CDR			X		
DEMAND RESPONSE PROGRAMS						
Commercial DR	CDR (1)	X				
Interruptible Program	CDR	X				
ETS Incentive DR Program	X RDR					X
Residential: SimpleSaver						
Air Conditioners	X RDR					
Water Heaters	X RDR					

* Recommended Methods:
RWB Res. Whole Building Protocol
RAL Res. Appliance & Lighting Protocol
RNC Res. New Construction Protocol
RDR Res. Demand Response Protocol
CIE Comm/Ind. Equipment Protocol
CWF Comm/Ind Whole Facility Protocol
CDR Comm./Ind. Demand Response Protocol

(1) Under some scenarios

This Framework proceeds from the most rigorous EM&V approaches in the left column, to the least rigorous on the right. Rigor is a term that refers to the amount of certainty one can apply to the results of the evaluation, as based on the level of actual measurement of impacts versus estimation. Typically, the more rigorous an EM&V Process, the more reliant the process is on technically detailed, primary data collection and measurement, which in turn usually means the higher the expense.

1.4 Relative Value, Costs and Benefits of EM&V

The EM&V Protocols developed by DNV KEMA are generally consistent with national standards, including current Uniform Methods Protocols being developed by the US DOE. We comment on the appropriateness of the Protocols for small G&T operations and cooperatives, and cite a recent study sponsored by the National Rural Electric Cooperative Association which analyzed the capacity of cooperatives to conduct EM&V, and the subsequent costs. Their recommendations are in line with the deemed savings approach already being used by EKPC as most appropriate for regulatory compliance, while still being within a reasonable range of costs. In this report, DNV KEMA comments on the relative value of pursuing a more rigorous EM&V processes for the added costs. As we examined the recommended approaches, we strove to provide recommendations that meet the needs of the various stakeholders and users of EM&V information, while minimizing costs and complexity.

Table 1-3 lists the range of budgets for EM&V using industry standard percentages of total DSM spending that is typically devoted to EM&V and EKPC's budget projections from the 5-Year Plan. These budgets assume that EKPC's portfolio of DSM programs will achieve the participation levels that are projected in the 5-Year Plan (i.e., that there will be enough program activity to justify the costs of evaluation).

Table 1-3: EM&V Budget Ranges for EE and DR

	EKPC EEDR Budgets & Potential EM&V Budgets			Proposed EM&V Budgets		
	EE Budget	DR Budget	Total EEDR $	@ 3%	@ 5%	@ 8%
2013	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2014	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2015	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2016	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2017	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Chapter 5 outlines an overview of the scenarios for compliance with projected PSC and PJM requirements under five different scenarios. DNV KEMA's recommended EM&V Protocols, if implemented, would require budgets in the 5-8% range for support of PSC requirements (scenarios 1 and 2). The incremental cost of compliance with PJM requirements for inclusion of only the $impleSaver Program (air conditioner and water heater demand response), identified as Scenario 3, should be relatively minor, since EKPC's third party vendor already collects much of the field data required and could work with EKPC (and its PJM support consultant, if applicable) to provide the required analysis and reporting. PJM incentives could offset those additional costs. Should EKPC opt to submit additional Direct Load Control programs (ETS and, when implemented, pool pump control), identified as scenario 4, these should also require modest incremental costs, with metering costs already identified in the recommended PSC compliance scenarios. PJM incentives could be expected to offset some/all of the incremental costs. The more significant incremental costs would be for submittal of the remaining programs, primarily energy efficiency, into the PJM capacity auction (identified as scenario 5). The level of monitoring and required precision (i.e., likely requiring increased sample sizes) for the forward capacity market submittal would not have been necessary under the PSC compliance scenarios.

2. Introduction

The current EM&V process at EKPC is based upon sound industry approaches that have been adequate for meeting the needs of the organization to date, primarily for Power Supply Planning. While good data are being collected on customer activities, it is being underutilized in the evaluation process primarily due to organizational issues. As a result, most programs use a deemed savings approach to estimate energy savings (i.e., kWh) and summer and winter coincidence peak demand reductions (i.e. kW). The exceptions are the Air Conditioner Direct Load Control and Water Heater Direct Load Control programs which are based on unverified implementer meter data. While EKPC staff desires to move to a more formal measurement and verification process, EKPC staff is concerned with the increased costs that a formal EM&V process may impose, particularly if those costs represent a high portion of the total DSM program budget.

This project was structured to address the following research needs:

1. Provide a comprehensive assessment of EKPC's EM&V function, including the key drivers affecting that process; and
2. Provide recommendations as to how EKPC should move forward to build an EM&V process and organization.

The following subsections describe the project research objectives and methodology.

2.1 Research Objectives

This EM&V DSM program assessment is designed to address the following research objectives:

- Confirm the energy savings being achieved by the programs based on current industry EM&V practice;
- Meet the various needs of stakeholders who are users of the information on DSM results;
- Assess various policy developments regarding the programs;
- Consider participation in the PJM capacity market; and
- Provide Owner-Members with information for managing their Member relationships and making program improvements.

2.2 Methodology

Table 2-1 contains the project team's approach to complete the EM&V DSM program assessment in seven tasks. EKPC staff and the project team discussed and confirmed this methodology at the project kick-off meeting on October 8th, 2012.

Table 2-1: EM&V DSM Project Assessment Project Tasks

Task No.	Task	Description
1	EM&V Requirements Assessment	Determine current and anticipated future requirements placed on EKPC EM&V function. Conduct stakeholder interviews and literature review.
2	PSC/PJM Scenario Analysis	Consider EM&V requirements under five different PSC/PJM policy scenarios and their implications; and three additional scenarios.
3	Owner-Member/ EKPC Needs &Capacity	Balance needs of 16 Owner-Members and EKPC capabilities; give interim presentation.
4	EM&V Protocol Framework	Prepare the EM&V Protocol/Framework for EKPC.
5	Staffing/Org Plan	Develop staffing and organizational plan for EKPC including in-house and consultant support, skills requirements and capacity development.
6	Gap Analysis	Conduct data and informational requirements and gap analysis.
7	Reporting and Meetings	Prepare comprehensive report and present results to EKPC management and, if desired, Owner-Member representatives; prepare separate Owner-Member communication piece.

3. EM&V Requirements and Needs Assessment: Stakeholders, Owner-Members and EKPC staff

EKPC serves a wide range of stakeholders and understanding these stakeholders' requirements and needs related to energy efficiency and demand response ("EE/DR") is critical to envisioning and shaping an enhanced EM&V function.

For the EM&V Requirement and Needs Assessment task, the primary objectives were to:

- Determine the current and anticipated future requirements placed on EKPC's EM&V function, such as regulatory or legislative directives.
- Solicit direct input from stakeholder groups that may be affected by an enhanced EM&V process including:
  - EKPC executives, managers and staff
  - Owner-Members
  - Independent consultant

In addition, the project team interviewed Hoosier Energy, a representative peer organization in the Midwest to provide a point of comparison with another Generation and Transmission (G&T) organization. Hoosier Energy has implemented robust EM&V processes for its DSM programs, using standard industry practices. Table 3-1 displays the in-depth interviews conducted for this project by respondent group.

Table 3-1: In-Depth Interviews Conducted by Respondent Group

Interview Respondent Group	Number of Interviews
Owner-Members	16
EKPC	16
External Consultant	1
Other G&Ts	1

This section contains the following subsections:

- **Methodology** – describes the research and interview process used to complete this project;
- **Current EM&V Process** – contains a summary and description based on findings from in-depth interviews and literature review (see Appendix A);

- **Regulatory and Legislative Stakeholders** – summarizes current and anticipated future regulations or legislation that may affect EKPC's EM&V function;
- Highlights of the findings from the interviews, by topic and by stakeholder (Owner-Members/EKPC).
- **Owner-Members** – contains the EM&V Needs and Capacity of EKPC's Owner-Members.
- **EKPC Staff and Management** – contains the EM&V Needs of EKPC executives, and managers.

3.1 Methodology

The project team used a three-step approach to complete this task, as follows:

1. Reviewed background documents and industry literature to understand any current or anticipated regulatory, legislative or other reporting requirements to be placed on EKPC's evaluation function;
2. Developed an interview guide and conducted in-depth interviews with EKPC executives and staff both in-person and by telephone; and
3. Developed an interview guide, using findings from the EKPC interviews, and conducted interviews, both in-person and by telephone, with representatives of EKPC's 16 Owner-Members. This included representatives from member services, marketing, and several executives.

The following subsections contain our results and analysis from these tasks.

3.2 Current EM&V Process

3.2.1 Overview

To assess the current program evaluation process, the project team followed these steps:

- Developed an interview guide;
- Conducted three telephone interviews in October and November 2012 with EKPC's independent consultant John Farley; and
- Reviewed written documentation received from John Farley and EKPC staff.

In the project team's assessment, John Farley has developed and executed an outstanding impact evaluation process given program data access and other limitations. These processes follow industry standards and incorporate leading industry data assumptions.

This subsection summarizes the current evaluation approach for DSM programs implemented in 2012 based primarily on written documentation from EKPC's independent consultant John Farley as well as interview survey results and the project team's analysis.

EKPC has offered DSM programs through its Owner-Members since the 1980s. As part of its regular management practices, EKPC has been conducting a basic level of impact evaluation on the programs, using an outside consultant with expertise in program evaluation and integrated resource planning, since the mid-1990s. EKPC has used the evaluation results primarily to inform the Power Supply Planning process through a deduction made to the system load forecast to account for anticipated demand reductions that occur due to the programs in any given year. Program estimated impacts are developed with the aggregated total savings from those estimates used to determine a percentage reduction in forecasted demand that appropriately represents the DSM contribution. Supply planning then proceeds from this DSM adjusted forecast. A minimal level of "naturally occurring" DSM is assumed in the load forecast as well to account for non-program changes in energy use driven by such factors as federal appliance standards or building codes.

The DSM evaluation process is currently an ad hoc process as opposed to a formal process. The current approach uses a "deemed savings" approach consistent with the Rural Utilities Service (RUS) reporting requirements. These requirements involve use of an Energy Efficiency Calculator worksheet[1]. While current levels of EM&V methods reflect a common but minimum level of industry practice, the approaches would likely be inadequate under regulatory or market condition scenarios assessed in Section 5-5.

Work is done, as needed, to support the different needs for information about DSM energy and peak demand savings as well as other parameters including measure costs, measure savings lives, free riders, and net-to-gross factors. Participation and other key implementation parameters are tracked for each DSM program.

Historically, EKPC has not followed a formal evaluation process. That is, there is not a separate EM&V group responsible, nor individuals with primary responsibility for evaluating the programs. Additionally, there has not been a separate EM&V budget allocated as part of program funding; rather, evaluation takes place as a part of the duties of staff and consultants with other responsibilities primarily related to Power Supply Planning. There is no regular schedule for impact or process evaluations, nor are there formal evaluation plans for the individual programs. The evaluation process and schedule is reactionary and driven by system load forecasting and planning requirements.

What work has been done to determine the energy and demand impacts of DSM programs has primarily been performed under the umbrella of DSM planning. DSM planning uses a variety of methods to determine costs, energy savings, measure lives, and free riders/net-to-gross ratios to perform its work for the IRP, the annual budget, the load forecast, the EIA 861 report, and other reporting requirements.

[1] Per John Farley; DNV KEMA conducted a cursory review.

EKPC tracks the number of participants for each DSM program through weekly reporting from the Owner-Members. Currently, EKPC employs a variety of EM&V procedures to determine the energy and demand savings for its existing DSM programs. These procedures include: end use metering and data logging, building simulation modeling, engineering algorithms employing field data, typical savings as a percent of consumption verified by field data and engineering calculations, simple engineering calculations, and deemed savings.

Deemed savings are derived from previous research conducted by EKPC, EPRI, and NRECA's Cooperative Research Network (CRN), or obtained from other utilities. These values are based on prior impact evaluations, to the extent that information is available.

The general approach for estimating program deemed savings is to combine baseline load forecast profile data, load profile data from other utilities, or generic load profile data with market penetration data to estimate baseline energy and demand characteristics. Baseline data is used to develop energy efficient case usage by adjusting the baseline with engineering estimates or general savings percentage assumptions. Currently, minimal actual participant data is used to estimate deemed savings. The exception is the Tune-Up HVAC with Duct Sealing program, for which savings are estimated using pre and post duct testing data.

3.2.2 Current Evaluation Methodology by Program

EKPC's independent consultant John Farley summarized the current evaluation approach for DSM programs implemented in 2012[2]:

1. **Electric Thermal Storage Incentive Program:** Energy and peak savings as well as hourly load profiles for electric heating with and without ETS are derived from a detailed end use metering study conducted by EKPC with EPRI and CRN in the late 90s (i.e., 1996-1998).

2. **Tune-Up HVAC Program:** Energy and peak savings are calculated based on an ACEEE study showing the percent savings from similar programs along with typical HVAC unit energy consumptions (i.e., UECs) and site-specific blower door results.

3. **Button-up Weatherization Program:** Savings are derived from site specific field data coupled with engineering estimates that are combined with impact evaluation results for similar programs at other utilities. Engineering calculations are produced using the REM RATE software program that is widely used in the building science industry.

[2] Written communication from John Farley, Nov. 1, 2012.

4. **Touchstone Energy Home Program:** Savings are calculated by comparing engineering simulation model runs for standard practice homes with homes built to Touchstone Energy standards.

5. **Touchstone Energy Manufactured Home Program[3]:** Savings are calculated using the target savings percentage applied to typical new manufactured home consumption.

6. **Compact Fluorescent Lighting Program:** Savings are calculated using simple engineering algorithms that include wattage, lifetime in hours, hours per day and net-to-gross ratios.

7. **Air Source Heat Pump (replacing resistance heat):** Savings are calculated by using simple engineering algorithms for improving SEER and HSPF combined with typical consumption for standard heat pumps and for resistance heating with central air conditioning.

8. **Commercial Advanced Lighting:** Savings are based on field data for connected load reductions combined with typical commercial lighting EUIs and load profiles.

9. **Industrial Compressed Air:** Savings are based on field data for connected load reductions combined with typical industrial EUIs and load profiles.

10. **Residential Direct Load Control of Water Heaters and Air Conditioners:** Summer and winter peak savings are based on ongoing M&V in the field using continuous data collection of customer samples with end use metering, HOBO meters and data loggers

3.2.3 Evaluation Data Collection Process

EKPC collects inputs on DSM program activity from four primary sources:

1. **Owner-Members**. Owner-Members submit program data to EKPC, via a password protected Web site, to request transfer payments (rebates) on behalf of their program participants. Owner-Members collect this program data from post-installation inspections at 100% of the participants' locations. EKPC does not require any documentation or evidence of these inspections, nor does it require Owner-Members to submit non-participant data. Non-participants are defined as Owner-Members who have an energy audit conducted by an Energy Advisor, but do not install any measures. Additionally, EKPC does not require Owner-Members use a standard data collection form, and consequently, some Owner-Members may collect data in addition to that required for the transfer payment request. EKPC receives only the data required for the transfer payment

[3] Program ending January 2013 and replaced by redesigned Heat Pump Retrofit program.

request. [redacted] collects these data, issues transfer payments, and forwards data to [redacted].

2. **EKPC's subsidiary Envision.** This subsidiary implements the energy efficiency programs to Owner-Members' commercial and industrial as well as residential customers. Energy Advisors submit onsite inspection results with requests for transfer payments and to [redacted]. EKPC's Web site does not currently allow transfer payment request submission for C&I programs.

3. **Analyst** [redacted] collects interruptible program data.

4. **Analyst** [redacted] collects direct load control program data.

The following depicts our understanding of the steps involved in EKPC's existing EM&V process following data collection. These observations are based on interviews conducted with EKPC staff and Owner-Members.

EKPC's IT department collects data submitted by the Owner-Members into a Crystal Reports database and grants limited access presumably only to [redacted]. From a preliminary analysis, the project team considers this database sufficient to meet current EM&V needs but access to this database may impede a more robust process.

Load forecasting analyst [redacted] collects and aggregates these data sets described above, and disseminates to EKPC executives, managers and staff; and to EKPC's external consultant who conducts calculation of program impacts as part of the IRP process. These data are stored in Excel spreadsheets. Access to historical data varies by data type but prior to 2010 is not broadly available.

3.2.4 EM&V Adequacy for Future Scenarios

While current levels of EM&V methods reflect a common but minimum level of industry practice, the approaches would likely be inadequate if the regulatory or market conditions shown in Figure 3-1 were in effect. Section 5.4 explores the EM&V requirements for each of these scenarios.

Figure 3-1: Potential Future EM&V Scenarios for EKPC

a. **Kentucky Public Service Commission (PSC)**:

i) If EKPC member(s) adopt a DSM surcharge.

ii) If Kentucky joins neighboring states to establish regional standards for EM&V requirements.

b. **PJM**:

i) EKPC only offers its DLC and interruptible programs into the PJM capacity auction.

ii) If EKPC also decides to offer its other demand response programs (ETS, commercial A/Cs, pool pumps) into the PJM capacity auction. Identify the minimum EM&V requirements to offer into the PJM capacity market. Provide the benefits and costs of doing so.

ii) If EKPC decides to offer its energy efficiency programs into the PJM annual auctions. Provide the benefits and costs of doing so.

3.3 Regulatory and Legislative Stakeholders

3.3.1 Overview

Currently, no legislation or regulatory articulation of EM&V requirements exists for EKPC's DSM programs. There are several nationally-recognized guidelines and manuals for EM&V of DSM programs that are often cited, referenced in regulatory and legislative orders or collaborative processes. As a point of comparison, the DNV KEMA project team compared EKPC's evaluation processes to the guidelines and requirements articulated in the following documents: (see Appendix for links to these and other major documents) A National Action Plan for Energy Efficiency; Modeling Energy Efficiency Program Impact Evaluation Guide (Nov. 2007).

1. US Department of Energy Uniform EM&V Methods Project (UMP) (forthcoming).
2. Analysis of Proposed DOE EM&V Protocols for National Rural Electric Cooperative Association, GDS (August 10, 2012).
3. California Standard Practice Manual Economic Analysis of Demand-Side Programs and Projects (2001).
4. American Public Power Association, Evaluating Your Utility's Energy Services Programs: Market Research and Evaluation for Energy Efficiency Professionals (2008).
5. PJM Manual 18B; Energy Efficiency Measurement & Verification, Revision 1.0 (March 2010)

Our recommendations for EM&V processes going forward are consistent with the methods espoused in the previous list of documents. They are generally considered as industry best practice by industry associations and research organizations, many of whom sponsored or participated in the development of the above guidelines.

In addition to the national literature, DNV KEMA reviewed regulatory and legislative documents for evidence of the positions of various stakeholders to EKPC's DSM programs regarding EM&V. EKPC is interested in understanding the level of evaluation rigor that might be anticipated in future regulatory or legislative policies, as well as the positions of outside parties that may influence those policies. Table 3-2 summarizes the results of our review of current EM&V requirements of key stakeholders.

The Kentucky PSC currently has no authority to mandate utilities under its regulatory control to implement or evaluate DSM programs. However, future regulatory risk cannot be ruled out since the Kentucky PSC has demonstrated a strong pro-energy efficiency stance. PJM offers the highest risk since the EM&V requirements are well known and will require substantial investment to transform the current processes to conform to standards outlined in PJM's Manual 18B. However, it also has the potential for producing the highest benefit/cost ratio.

Table 3-2: Current EM&V Requirements, by Stakeholder

Stakeholder	Current EM&V Requirements	Mandatory/Voluntary	Risk Level	Highest Est. Benefit/Cost Ratio
EIA	Form 861	Mandatory	Low	Low
KY Executive Branch/DEDI*	EE Reporting Template	Voluntary	Low	Low
KY Legislation	none	--	Low	Medium
KY PSC	none	--	Low	Medium
PJM	Manual 18B	Mandatory	High	High
RUS**	Form 7, Part P	Mandatory (for RUS borrowers)	Low	Medium
SERC/NERC			Low	Low

*RUS=Rural Utilities Services

**DEDI=Kentucky Department of Energy Development and Independence

It is important to note that outside stakeholders can influence the determination of EM&V requirements either individually through formal participation as interveners in rate cases, or as participants in collaborative advisory groups set up by Commissions in some states. For example, the EKPC Demand Side Management and Renewable Energy Collaborative, established in 2010, brings together the Sierra Club, the Kentucky Environmental Foundation and Kentuckians for the Commonwealth with EKPC and its 16 Owner-Members to expand DSM and renewable energy deployment.

While recent interveners have represented environmental organizations, other interested outside parties that can take a standing in utility rate proceedings may consist of regional groups such as those representing industrial customer interests or other trade associations, and organizations representing individual customer segments, such as low income households. While this collection of interested outside parties do not typically have direct EM&V requirements, their concerns regarding the level of DSM spending, potential customer benefits and burdens will indirectly affect the EM&V process.

This study did not identify any specific positions of likely intervenors in the Kentucky regulatory environment, but rather notes general positions held by such parties in other jurisdictions as indicative of what they might raise were future legislation or regulation be considered. For example, organizations that are focused on environmental benefits, such as greenhouse gas reductions, might influence the determination of EM&V requirements for measuring such impacts. Industrial customer interveners, on the other hand, are often concerned with understanding the benefits and costs of programs to specific customer segments.

A slight majority of states (52% of those with ratepayer-funded DSM programs) only allow outside parties to influence the evaluation process informally, through public hearings, where they are limited to the opportunity to comment on regulatory policy. In 18 states, other parties participate in utility advisory groups or collaborative bodies where they have more direct influence on the development of evaluation requirements.[4]

Regulatory bodies and state legislators are sometimes influenced by trends in peer states as they consider various policies. While Kentucky currently has no legislative or regulatory mandates regarding EM&V, a review of trends among state regulatory bodies may provide some evidence as to what EKPC might anticipate in the future, were the State legislature or Commission to move in this direction.

The American Council for an Energy Efficient Economy (ACEEE) conducted a recent review of regulatory positions regarding EM&V requirements of DSM programs: ***A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs***.[5]

Key findings in the report include the following trends:

- Forty-four states plus the District of Columbia (45 total) currently have some level of formally approved ratepayer-funded energy efficiency programs in operation. Exact treatment of cost recovery and lost revenue recovery varies.

- Most states consider, if not require, several of the five classic cost-effectiveness or benefit-cost tests identified in the California Standard Practice Manual (see Appendix A). Total Resource Cost (TRC) is the current primary test for decision-making by 71% of states surveyed.

- There is significant diversity among states as to the use of "net" versus "gross" energy savings with 53% using net, 26% using gross, and 21% using both values. Net energy savings calculations account for free-riders, defined as customers that would have likely installed measures (i.e. saved the energy) without the program. Net savings calculations might also add spill-over savings, or additional actions taken by customers to save energy beyond those actions specifically attributable to the program. Most states using net savings figures adjust for free-ridership but do not adjust for spillover (similar to EKPC).

- "Bottom up" evaluation (like that used by EKPC to date) is the most common current method used by 60% of states with ratepayer-funded programs - i.e., methods based on deemed savings

[4] ; ACEEE; Kushler, Martin, S. Nowak and P. Witte; ***A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs***; Report No. U122, February 2012, ACEEE, Washington DC, (February 2012) - page 7.

[5] Ibid.

estimates of key parameters (such as lifetimes of measures, or per unit energy savings) multiplied by the number of participants or measures. Top-down approaches, now used by only 3%, used to dominate the field and involved billing analysis or other whole building methods. Thirty-seven percent (37%) use a combination of both. The trend toward deemed savings approaches is being driven by the explosion of new programs, limited budgets, and more reliable measurement-based estimates of per unit savings.

- Seventy percent of states that use deemed savings values take them from sources or databases from other states, often published as Technical Resource Manuals (TRMs), while 24% of utilities develop and file their own.

Examples of two other G&T companies that are getting more involved in EM&V are the Tennessee Valley Authority and Hoosier Energy (Indiana). TVA launched full scale EM&V effort in 2009 with the first evaluation of its flagship residential program. This effort included on-site verification visits to samples of participating customers of TVA's 155 local distribution companies. With a staff of one Director, two analysts and one part time internal resource, TVA manages a large external EM&V process carried out by an outside contractor under a three year contract. A feature of this strategy is to maintain the independence of the evaluation effort to the benefit of all parties. Impact evaluation results are being used to true up estimated savings claims by the distribution companies going forward, but are not impacting settlement (i.e. transfer) payments already made. The EM&V effort expanded into two more residential programs in 2012, and is addressing C&I programs and a heat pump program in 2013.

Hoosier Energy has similarly enhanced its EM&V activities in the recent past. They have approximately 2.5 FTEs on staff to handle DSM program management and evaluation, and are using outside implementation and evaluation vendors. Neither group is responding to regulatory directives for this work, but rather are following the stricter EM&V guidelines as a matter of increasingly the reliability of their DSM investments and being in a better position for prudent program management and future planning.

While one cannot predict the policy direction of the regulatory and legislative bodies in Kentucky, the findings above suggest the range of options that peer organizations are pursuing to help provide direction regarding EM&V requirements for the ever-expanding portfolios of DSM programs being implemented with ratepayer funding.

3.4 Owner-Members: EM&V Needs and Capacity

Owner-Members are a key stakeholder in the EM&V assessment process since they are EKPC's primary customers, residential DSM program implementers, and providers of program data. In total, the team conducted interviews with 16 Owner-Members: six conducted in-person and ten by telephone.

The project team interviewed a range of Owner-Member staff and executives. Table 3-3 displays the Owner-Members interviewed by respondent type. The project team extended interview invitations to all the Owner-Member CEOs. Two CEOs participated in the interview process. Most of the interviews respondents were from member services, marketing, communications, or management.

To build trust and encourage candor in these interviews, we summarize the findings in aggregate and not by Owner-Member or by respondent. The results of these interviews are described in the following subsections:

- DSM Programs
- EM&V
- Enhanced EM&V Processes
- Owner-Member Capacity
- Concerns

Table 3-3: Owner-Member Interviews by Respondent Type

Owner Member	Member Services / Marketing	CEO / Executive
Big Sandy RECC	✓	
Blue Grass Energy	✓	
Clark Energy	✓	
Cumberland Valley Electric		✓
Farmers RECC	✓	
Fleming-Mason Energy	✓	
Grayson RECC	✓	
Inter-County Energy	✓	
Jackson Energy	✓	
Licking Valley RECC		✓
Nolin RECC	✓	
Owen Electric	✓	
Salt River Electric	✓	
Shelby Energy	✓	
South Kentucky RECC	✓	
Taylor County RECC	✓	

3.4.1 DSM Programs

Most of the Owner-Member respondents reported they are pleased with the current suite of DSM programs that EKPC offers. Several mentioned that they appreciate the support offered by EKPC, such as marketing, program reporting (e.g. RUS), and the services of an energy advisor.

Table 3-4 displays the DSM programs that Owner-Members currently implement. Five Owner-Members offer the full suite of DSM programs to their Members while seven offer either six or seven programs. This correlates to Owner-Member size, geography, as well as attitudes toward energy efficiency that respondents related during the interview.

Table 3-4: Current DSM Program Implementation, by Owner-Members

	DSM Programs									
Owner-Member	Button-Up Weatherization	Button-Up with Air Seal	HVAC Duct Sealing	Touchstone Energy Home	Touch-stone Energy Manu-factured Home	Electric Thermal Storage	Heat Pump Retrofit	Simple Saver (DLC AC and Water Heaters)	Comm. Advanced Light	Industrial Compress-ed Air
Big Sandy RECC	✓	✓	✓	✓	✓		✓	✓	✓	
Blue Grass Energy	✓	✓	✓	✓	✓		✓	✓	✓	✓
Clark Energy	✓	✓		✓	✓	✓	✓	✓	✓	✓
Cumberland Valley Electric	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Farmers RECC	✓	✓	✓	✓	✓		✓	✓	✓	✓
Fleming-Mason Energy	✓	✓		✓		✓	✓	[planning]	✓	✓
Grayson RECC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inter-County Energy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Jackson Energy	✓	✓	✓	✓	✓	✓	✓		✓	✓
Licking Valley	✓	✓	✓	✓	✓		✓	✓	✓	✓
Nolin RECC	✓			✓	✓		✓	✓	✓	✓
Owen Electric	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Salt River Electric	✓			✓			✓	✓	✓	✓
Shelby Energy	✓			✓	✓		✓		✓	✓
South Kentucky Rural Electric	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Taylor Country RECC	✓	✓		✓		✓	✓	✓	✓	✓

3.4.1.1 Increasing Program Participation

When asked how to increase DSM program participation, the most frequently mentioned responses included:

- Increasing marketing and sales;
- Building trust with customers; and
- Increasing program awareness and generating interest in program offerings.

Most Owner-Members could not articulate why program participation is, for the most part, extremely low, beyond the general reasons summarized above. Some of the respondents raised concerns that program participation decreases profit and increases demands placed on Owner-Member staff. These concerns may limit the resources devoted to increasing DSM activity.

About half the respondents lamented the low program participation levels, and voiced support for any additional EKPC assistance for increasing DSM activity, including additional Energy Advisor support. When asked, most respondents would consider other assistance such as outsourced implementation, but shared concerns about possible impacts on local area contractors or disruptions to Member-Owner operations.

3.4.2 EM&V Awareness / Knowledge

Approximately three-fourths of Owner-Member respondents interviewed were not familiar with the EM&V impact evaluation process that EKPC currently follows. Among the remaining respondents, one could accurately describe the process that EKPC undertakes to derive impact evaluation data for its DSM programs. The remaining respondents could recall at least one or more aspects of this evaluation process such as: definition of "deemed savings" or receiving EKPC documentation or training on evaluation.

3.4.3 Enhanced EM&V Processes

Nearly all Owner-Members interviewed voiced support for an enhanced EM&V process. However, lack of familiarity with evaluation likely led respondents to voice support with caveats such as expectations that EKPC would undertake the needed work; minimal disruption to Owner-Member staff or business operations and clear instructions on any additional processes or required data.

3.4.4 Owner-Member Capacity

Any of the five PSC/PJM scenarios (see Section 5.4) require more data and documentation than the Owner-Members currently provide to EKPC. This section discusses the Owner-Members current capacity, potential capacity, ability, and willingness to contribute to an increased evaluation function.

Section 7 discusses data gaps in more detail while this subsection covers Owner-Member response to data gaps.

3.4.4.1 Program Staffing

Owner-Members reported employing an average of 2.32 FTEs to handle all DSM related activities. The reported roles include: program planning, implementation, data collection, recordkeeping, accounting and evaluation activities. The range in responses was very broad with a high of 7.25 FTEs[6] and low of 0.75 FTEs indicating that there was likely a significant difference in interpretation of this question. Given the wide range of responses, it is likely that these figures represent staff that have more than one responsibility and are not just dedicated to DSM. Table 3-5 displays the reported number of Full Time Equivalents (FTEs) employed by the Owner-Members for the DSM program activities as well as the corresponding number of hours per year, based on a 40 hour work week and 52 weeks per year. Three Owner-Members were unable to estimate FTEs and are reported as "n/a" in the table. Owner-Member staff availability will determine support for any increased EM&V process as well as increasing residential DSM program activity implemented by Members.

Table 3-5: DSM Program Staffing by Owner-Members, by FTEs

FTEs by Owner Member	Hours/Year
7.25	15,080
5.5	11,440
2.9	6,032
2.6	5,408
2.5	5,200
1.9	3,952
1.4	2,912
1.4	2,912
1.3	2,704
1.05	2,184
0.85	1,768
0.8	1,664
0.75	1,560
n/a	n/a
n/a	n/a
n/a	n/a

[6] Full-time equivalent

3.4.4.2 Billing and Metering Data

Recommended protocols for residential weatherization programs require access to its Owner-Members customer energy usage data for all (or most) participants and possibly non-participants. Currently, Owner- Members send monthly billing data to the load research staff. This data may be sufficient for an enhanced EM&V process; any additional data requests would require Owner-Member consent and participation. Most Owner-Members said they would be willing to meet billing data requests: two readily agreed; and the remaining Owner-Members were evenly split between those who consented but had concerns about data security, and those who required more information before making a determination. None of the Owner-Members declined this request.

The concerns relate to how the process may impact their business operations and what staff may be needed. Several respondents mentioned automating the process as much as possible to alleviate Owner-Member involvement. Typical comments from the Owner-Members include:

- *"We need minimal intrusion because we're a small shop. Can the process be automated?"*
- *"Maybe EKPC offers some kind of program that we can access online. If you input data, it kicks out whatever information you're looking for."*

EKPC could decrease Owner-Member burden through education, instruction, and minimizing business disruption, where possible.

In addition, recommended protocols for demand response programs call for metering data. As EKPC is aware, all Owner-Members either currently have or are seeking AMI capabilities (relevant to DLC). Owner-Members use either SEDC or NISC-XL+ billing systems. Preliminary investigations with EKPC's IT department indicate that billing data transfer can be accomplished using in-house staffing capabilities, if EKPC chooses to automate the process.

Table 3-6: Owner-Member Billing System and AMI Capabilities

Owner Member	Billing System	AMI Meter Brand (DLC)	Hourly Data Available
Big Sandy RECC	SEDC	Aclara	
Blue Grass Energy	SEDC	Landis+Gyr	
Clark Energy	NISC-XL+	Landis+Gyr*	
Cumberland Valley Electric	NISC-XL+	Landis+Gyr	
Farmers RECC	SEDC	Aclara	
Fleming-Mason Energy	SEDC	Tantalus**	
Grayson RECC	SEDC	Landis+Gyr*	
Inter-County Energy	SEDC	Landis+Gyr	
Jackson Energy	NISC-XL+	Aclara	
Licking Valley RECC	NISC-XL+	Landis+Gyr*	
Nolin RECC	NISC-XL+	Landis+Gyr	
Owen Electric	SEDC	Cannon	✓
Salt River Electric	SEDC	Landis+Gyr	
Shelby Energy	SEDC	Aclara	
South Kentucky RECC	SEDC	Aclara	✓
Taylor County RECC	SEDC	Aclara	

*partially implemented

**recently signed contract

3.4.4.3 Program Data and Recordkeeping

In Section 3.2.3 we provided a general overview of how Owner-Members collect and store energy efficiency program data. On a monthly basis, Owner-Members transmit data to EKPC when requesting transfer payments and only send what is requested in the EKPC form. For its part, EKPC does not take full advantage of the data provided, but focuses instead on the elements that are needed to calculate transfer payments to Owner-Members. More detailed data collected for energy audits resides with the Owner-Member, typically stored in hard copy (paper).

3.4.5 Roles and Responsibilities

Most Owner-Members respondents want EKPC to analyze, store and keep track of DSM program data for any enhanced EM&V effort. This may create tension if EKPC prefers the Owner-Members take more responsibility. However, the program team notes that since the Owner-Members are program implementers, they should not evaluate their own programs for inherent conflict of interest reasons. Standard industry practice calls for an independent, third-party evaluator who has no financial or other

stake in the evaluation outcome. This independent party could be an internal EKPC function or an external function managed by EKPC.

3.5 EKPC Staff and Management: EM&V Needs

The DNV KEMA team interviewed sixteen members of the EKPC staff and one consultant who are involved in the development with or are users of DSM evaluation information. The staff interviewed ranged from an Executive Vice President to field Energy Advisors.[7] Most of the information gleaned from these interviews has been used to inform other sections of this report. We have captured the general themes that resonated across groups and individuals in some highlights below.

In-depth one-on-one interviews were conducted following this list of topics:

- Tenure and technical background of staff
- Whether a user or practitioner of EM&V information, and needs regarding their role
- Data collection and maintenance, future data needs
- Concerns regarding expanding the EM&V activity (organization, staffing, etc.)

Findings are provided below. To protect the confidentiality of the interviewees, we summarize key themes that were mentioned in more than one interview, along with salient comments as supporting evidence where useful.

3.5.1 Tenure and Technical Background of Staff

Tenure with an organization and technical background can be useful to gauge future staffing needs and to support an enhanced EM&V effort. Most of the staff interviewed for this study had been with EKPC for several years, although not always in the same positions. Specific EM&V expertise is lacking; however several staff have important skill sets that can be turned to EM&V functions internally; i.e., engineering, economics or statistics degrees. Currently, Energy Advisor skills are probably the most critical to the data collection effort (where the data are actually being used for evaluation purposes) and could be turned to oversight of verification in an enhanced operation. The long standing tenure of many of the EKPC staff speaks well of the organization overall, and their continuity and long-standing relationships provide confidence to Members. While these benefits can and should be leveraged and changes are made toward increased DSM activity, additional skills are needed. There are existing staff that could be trained

[7] We wish to thank those who participated in the EKPC staff interviews and gave generously of their time and information: David Crews, Alma Gentry, Ann Wood, Beth Willoughby, Greg Whittaker, Jamie Hall, Jeff Hohman, Josh Littrell, Julie Tucker, Linda Perry, Mark Mefford, Scott Drake, Sandy Mollenkopf, Sha Collier, Todd Pauley, and John Farley.

through the many industry organizations that provide EM&V skills training, but there would also be benefits to bringing in one EM&V subject matter expert to help develop the function and provide on-the-job training to staff.

3.5.2 Needs of Users and Practitioners of EM&V

There were many needs expressed on the part of both evaluation practitioners and users of the information. Access to the DSM database was a common refrain in interviews, along with more useful information. An example is the ability to respond to queries from members about the effectiveness of advertising (i.e. is it worth it? Which campaigns work better than others? What needs do customers have for information regarding EE opportunities?) The needs expressed point to the dual functions of an effective EM&V process – that of serving Program Managers and the people who deliver the programs to customers, as well as system planners who are counting on the DSM resource as part of integrated resource planning. Both audiences must be served with equal attention, products and respect ideally through an effective team comprised of both quantitative modeling skills and market research skills.

The use of an outside consultant (while he is generally praised) is problematic to some in that they would prefer to have this be an internal function, so that assumptions could be altered and modeling conducted on a more iterative basis. While there was general agreement as to the high level of performance of the consultant, there is a growing sense of risk/vulnerability in not having this capability in house. Some called for at least one subject matter expert to be on staff to better direct and manage the program planning, goal setting and EM&V processes that require analytical support. This person could also provide regulatory testimony on behalf of EKPC on the EM&V function.

3.5.3 DSM Data Collection and Maintenance

This was the area of most confusion and consternation among interviewees. There is significant frustration in how data are captured, where it goes, who has control over it, who has access, and how to get information out of the database that is useful to a variety of users. Development and maintenance of DSM data by the IT department might have made sense when the system (Crystal, Reports) was put in place, however the current structure is too limiting for effective EM&V and program management purposes. The main users do not feel that they have adequate understanding of the data or even what is available.

Some call for a dashboard type of system with different levels of password-protected access, where members as well as internal staff could track program performance on a more regular basis. Benchmarks between members could be set up (some other organizations do this anonymously so that each member can see their own program performance results as compared to unnamed others, who are only numbered and the order changed at random.) Customized software systems are typically provided by

implementation vendors based on a standard proprietary format and provide a good balance of data protection, multiple reporting platforms, and benchmarking with remote access capabilities. There are also a few stand-alone systems (e.g. AEG's Vision software) that are available by other suppliers, but these must also be customized to each client.

3.5.4 Concerns regarding Expansion of DSM and EM&V

Probably the biggest concerns raised about expansion of DSM by EKPC staff is the need for regulatory policies to better align with Owner-Member needs for not only cost recovery, but recovery of lost revenues. The lack of motivation for Owner-Members to be more aggressive about DSM was pointed out by several interviewees. A secondary concern on the part of EKPC staff for their members was their lack of staff to be able to handle increased volumes of activity.

These concerns point to the tension between the potentially large energy savings/demand response resource that exists in the EKPC service territory at customer sites, and the challenge of capturing that resource through cost effective programs. EM&V presents the second part of the challenge – how to measure the impacts in a cost effective way.

EKPC staff members involved in DSM appear somewhat insecure of their current EM&V capabilities and foundation of methods and data, and worry about what it will take to step it up. The confusion may be a side effect of the fragmented structure of DSM data collection, delivery, analysis and reporting that currently exists. There is no clear DSM champion, or clarity as to who is "responsible for" the achievement of DSM goals (even though virtually all staff involved in the process are committed to its success). Organizational improvements should serve to clarify objectives and opportunities as well as how the organization will proceed to capture DSM benefits.

EKPC management and staff are concerned about potential pressures from outside groups such as the regulatory community and intervenors, to enhance their DSM and EM&V processes. Several point to the desire to make changes in terms of organization, staffing, training and database management to meet the challenges ahead, whether market- or regulatory driven. This portends well for implementation of changes, which most of those interviewed appear to welcome. There were few staff, in fact, that were negative about enhancing either DSM activity or EM&V functions, with the exception being the general concern about Owner-Member capabilities and motivations for doing so. The naturally protective attitude toward their members speaks to EKPCs high level of customer service. This also underlies their wish to help move the regulatory community toward more favorable treatment to each that transition for members, so that DSM can become a more viable resource in Power Supply Planning, and for end-use customer benefit.

4. PJM Demand Response Market Options

4.1 Introduction

With EKPC's entry into PJM expected in 2013, the company will have the opportunity to offer not only its generation supply resources, but also its demand side resources into PJM's markets for Energy, Capacity and Ancillary services. The most fundamental key to understanding demand side resource opportunities in PJM is to understand that PJM, with very few exceptions, does not provide special markets for demand response. Instead, it has crafted rules for demand response to participate in existing markets alongside and in competition with generation supply resources. As such, the basic strategies for bidding and managing demand side resources for EKPC should be driven first by a view of the markets themselves and not a unique approach to DSM.

As noted, PJM operates three categories of markets for resources. Each may have specific requirements for scheduling, daily bidding and settlements. The scope of this section is not intended to review the detailed mechanics of most of these processes. Instead, this section will address high-level descriptions of market options. With particular focus paid to how EKPC could approach their options in the upcoming PJM capacity auctions. This section will also provide a framework for valuing current and future DR resource capabilities.

4.2 Capacity Market and Demand Response

Since 2007, PJM has a new capacity market auction procurement system known as the Reliability Pricing Model (RPM). This market allows for supply and demand to bid MWs of installed capacity to PJM for use meeting resource adequacy requirements. These resources are callable by PJM throughout the year during emergency conditions as determined by PJM.

In recent years demand response offers into the PJM capacity market have become a significant portion of the installed capacity reserves. In recent auctions, approximately 10% of the installed capacity has cleared from DR resources. The major reason for this is the significant prices that have been produced in this market for these emergency resources. Since the first annual auction in 2007, prices for RTO wide capacity have averaged just over $88/MW/Day. This is an annual market so that price is paid to any resource that clears for each day of the planning year. Table 4-1, produced by the PJM market monitor, shows all auction clearing prices since the RPM was launched, through the 2014-15 planning year.

Table 4-1: PJM Clearing Prices, Launch to 2014-15 Planning Year

		RPM Clearing Price ($ per MW-day)							
	Product Type	RTO	MAAC	APS	EMAAC	SWMAAC	DPL South	PSEG North	Pepco
2007/2008 BRA		$40.80	$40.80	$40.80	$197.67	$188.54	$197.67	$197.67	$188.54
2008/2009 BRA		$111.92	$111.92	$111.92	$148.80	$210.11	$148.80	$148.80	$210.11
2008/2009 Third Incremental Auction		$10.00	$10.00	$10.00	$10.00	$223.85	$10.00	$10.00	$223.85
2009/2010 BRA		$102.04	$191.32	$191.32	$191.32	$237.33	$191.32	$191.32	$237.33
2009/2010 Third Incremental Auction		$40.00	$86.00	$86.00	$86.00	$86.00	$86.00	$86.00	$86.00
2010/2011 BRA		$174.29	$174.29	$174.29	$174.29	$174.29	$186.12	$174.29	$174.29
2010/2011 Third Incremental Auction		$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00
2011/2012 BRA		$110.00	$110.00	$110.00	$110.00	$110.00	$110.00	$110.00	$110.00
2011/2012 First Incremental Auction		$55.00	$55.00	$55.00	$55.00	$55.00	$55.00	$55.00	$55.00
2011/2012 ATSI FRR Integration Auction		$108.89	$108.89	$108.89	$108.89	$108.89	$108.89	$108.89	$108.89
2011/2012 Third Incremental Auction		$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00
2012/2013 BRA		$16.46	$133.37	$16.46	$139.73	$133.37	$222.30	$185.00	$133.37
2012/2013 ATSI FRR Integration Auction		$20.46	$20.46	$20.46	$20.46	$20.46	$20.46	$20.46	$20.46
2012/2013 First Incremental Auction		$16.46	$16.46	$16.46	$153.67	$16.46	$153.67	$153.67	$16.46
2012/2013 Second Incremental Auction		$13.01	$13.01	$13.01	$48.91	$13.01	$48.91	$48.91	$13.01
2012/2013 Third Incremental Auction		$2.51	$2.51	$2.51	$2.51	$2.51	$2.51	$2.51	$2.51
2013/2014 BRA		$27.73	$226.15	$27.73	$245.00	$226.15	$245.00	$245.00	$247.14
2013/2014 First Incremental Auction		$20.00	$20.00	$20.00	$178.85	$54.82	$178.85	$178.85	$54.82
2014/2015 BRA	Limited	$125.47	$125.47	$125.47	$125.47	$125.47	$125.47	$213.97	$125.47
2014/2015 BRA	Extended Summer	$125.99	$136.50	$125.99	$136.50	$136.50	$136.50	$225.00	$136.50
2014/2015 BRA	Annual	$125.99	$136.50	$125.99	$136.50	$136.50	$136.50	$225.00	$136.50

As EKPC considers the value proposition of investing in demand response for use in the PJM capacity market a relatively simple calculation can give an indicative present value of such an investment. In reality, the future value of capacity in these markets will be driven by the intersection of supply and demand in the region. For purposes of this exercise, the example below uses the straight average of the eight annual auctions since 2007 ($88.59) for estimating the value of a resource investment. These numbers are nominal and not adjusted for inflation.

*Value of 1 MW of installed capacity from DR: 1*365*$88.59=$32,334.89*

Assuming a seven (7) year usable life with 2.5% annual inflation of capacity prices and a 6.5% discount rate suggests a net present value for 1MW of installed DR capacity is equal to $190,027 or just under $200/kW.

The above example assumes the average price of capacity as seen in the Base Residual Auction. The BRA occurs three years in advance of the delivery year and therefore will not be the best proxy price to consider for EKPC's initial entry into PJM in 2013. Three separate auctions may be held in the spring of 2013. These will cover incremental auctions for 2013-14, 2014-15, 2015-16, and the BRA for 2016-17. The historic prices for different auction types should be taken into account when considering expected value. Historically, incremental auctions held closer to the delivery year have cleared at lower prices than the base residual auction.

4.2.1 Implications for EKPC

As EKPC considers its short and longer term strategy for developing and bidding DR to PJM, it should fully understand its ability to deliver a MW of capacity bid and cleared. Given the penalty structures in

place for failures to actually deliver capacity that has been sold at auction, some initial conservatism should be considered in bidding resources into the near term auctions.

Until processes and procedures are in place and fully vetted with actual market experience, EKPC's DR bidding in near term auctions should be assigned greater risk profiles in the risk management process than would normally be assigned. Any new market entry will require real world experience with market operations to ameliorate this additional risk assignment.

Among the key issues EKPC will need to account for beyond operationalization of DR to meet commitments in the market volatility of the price of capacity in PJM. This represents a paradigm shift away from a cost of service assignment for revenue associated with implementation of such programs. To the extent EKPC needs to account for the risks of price volatility year to year, new rate structures may be warranted that allow for an adjustment each year to account for revenue over or under collection from the wholesale market. This might take a form similar to a fuel cost adjustment construct, but in this case would be a either a credit or charge depending on the current market value.

4.3 Other PJM Markets

The prior section discussed only the capacity market and potential value of resources sold in that market. However, PJM's primary market is its energy market. This market allows resources (supply and demand) to offer hourly energy with day-ahead or real-time scheduling. Many types of demand response will be capable of offering, clearing and being paid for hourly energy. This type of activity can be very lucrative if automated controls are used for dispatch and the marginal cost to operate is low. To participate in the energy market from the demand side, hourly meter data will be required for calculation of demand response under PJM's energy market M&V methodology for settlement purposes.

PJM operates two ancillary services markets that allow demand response participation: Synchronized Reserves and Regulation. Both are discussed in the following sections.

4.3.1 Synchronized Reserves

The Sync reserve market is run with an hourly market for resources to be available in subsequent hours to provide real time reserves from resources synchronized with the grid. DR meets this definition if it has 1-minute scan rate or better metering at the site. The primary compliance requirement is to follow a deployment request within 10 minutes[8].

[8] http://www.pjm.com/markets-and-operations/demand-response/dr-synchro-reserve-mkt.aspx

4.3.2 Regulation Market

PJM's regulation market is also procured on an hourly basis for subsequent hours. For DR sold as regulation, direct telemetry and automation for response is required. The expected response time for regulating resources is just a few seconds. This will require full automation for DR based resources.

5. EM&V Framework and Protocols

This section describes DNV KEMA's recommendations for EM&V Protocols under five scenarios as EKPC articulated for this project. An EM &V Framework is provided for determining which Protocol should be applied to each program under each scenario. This section discusses:

- EM&V Framework;
- Standard IPMVP Protocols for Existing EKPC Programs;
- EM&V Protocols for Existing EKPC Programs; and
- PSC/PJM Scenario Overview.

5.1 EM&V Framework Discussion

Evaluation of energy efficiency (EE) and demand response (DR) programs is a well-developed field of research that combines engineering and economic concepts. There is a robust literature of methods available from which to devise an appropriate EM&V framework for any given entity that delivers EE programs and wishes to understand their impacts. DNV KEMA has prepared this EM&V Framework and attendant Protocols for East Kentucky Power Cooperative for application to existing and future EE and Direct Load Control programs under a range of regulatory and market scenarios.

The specific methods applied for evaluating an EE or Direct Load Control program is based on two primary factors:

- Whether the program promotes individual end-uses or measures, or impacts an entire facility (i.e., whole building);

- Whether the program is seeking energy savings, (EE), peak load reductions (DR) or a combination of the two. (Note that other program objectives are often the subject of evaluation, such as customer satisfaction, reduced energy burden, improved comfort, etc., however the primary focus of this framework is on quantitative impacts.)

External factors that affect the methods to be applied include:

- The audience for the evaluation: (e.g., Program implementer, internal management, external stakeholder, regulatory, legislative or market needs and requirements for EM&V results;

- The budget for evaluation in total and relative to the program expenditures and value of the impacts.

DNV KEMA has developed an EM&V Framework that presents a set of methods appropriate to varying levels of rigor applied to a program evaluation based upon the audience, evaluation requirements and budget. This Framework is presented in Table 5-1.

Table 5-1: EM&V Framework

	Current Practice and Recommended Protocols					
EKPC DSM Program Evaluation Approach	End-use metering studies	Whole facility metering	Statistical billing analyses of utility consumption data	Development and use of engineering algorithms	Building energy simulation modeling	Deemed savings calculation
Current Practice = X, Recommended Method*		None of the programs currently have whole facility metering	None of the programs currently have whole facility metering			
RESIDENTIAL EE PROGRAMS						
Residential Weatherization						
Button Up Weatherization Program		RWB	RWB	X		X
Button Up with Air Sealing		RWB	RWB	X		X
Residential HVAC Equipment						
HVAC Duct Sealing Program		RWB	RWB	X		X
Heat Pump Retrofit Program	RAL (1)	RWB	RWB	X		X
Residential New Construction						
TSE Home		RNC			X	X
TSE Manufactured Home Heat Pump Retrofit	CIE (1)	RNC	RNC			X
Advance Lighting Program LED (Unit = 1 bulb)	RAL			X		X
COMMERCIAL EE PROGRAMS						
Commercial Advanced Lighting	CIE			X		
INDUSTRIAL EE PROGRAMS						
Compressed Air	CDR			X		
DEMAND RESPONSE PROGRAMS						
Commercial DR	CDR (1)	X				
Interruptible Program	CDR	X				
ETS Incentive DR Program	X RDR					X
Residential: $impleSaver						
Air Conditioners	X RDR					
Water Heaters	X RDR					

* Recommended Methods:
RWB Res. Whole Building Protocol
RAL Res. Appliance & Lighting Protocol
RNC Res. New Construction Protocol
RDR Res. Demand Response Protocol
CIE Comm/Ind. Equipment Protocol
CWF Comm/Ind Whole Facility Protocol
CDR Comm./Ind. Demand Response Protocol

(1) Under some scenarios

Each column represents an EM&V Protocol that combines the data collection and analytical methods appropriate to a type of DSM program and customer sector. The Framework indicates the appropriate

Protocol to be applied to each program depending on the level of rigor required under each of the five scenarios articulated by EKPC as possible futures.

5.2 Standard IPMVP Protocols for Existing EKPC Programs

EM&V protocols for the current set of EKPC programs should follow International Performance Measurement and Verification Protocol (IPMVP)[9]. Standard protocols for various types of energy conservation measures are categorized by "options", including the following, applicable to the EKPC:

International Performance Measurement and Verification Protocol (IPMVP) Option A: Where specific equipment is involved, IPMVP Option A is the appropriate EM&V method to apply. IPMVP Option A is a partially measured retrofit isolation study that meters the selected parameters leading to the change in energy and demand of an installed efficiency measure from a representative sample of participants, and adjusts the savings estimates derived from engineering algorithms applied to the Company's program participation data. The ratio of the deemed savings and adjusted savings, also called a realization rate, is then applied to the population of participants to estimate program savings.

International Performance Measurement and Verification Protocol (IPMVP) Option B: Where specific equipment is involved, IPMVP Option B is the appropriate EM&V method to apply. IPMVP Option B is a field measurement of the energy use system to which the measure was applied, separate from the energy use of the rest of the facility. Short-term or continuous measurements are taken throughout the post-retrofit period. Isolation study that meters the selected equipment affected by the measure or replacement, which may include representative sample of participants, and adjusts the savings estimates derived from engineering algorithms applied to the Company's program participation data. The ratio of the deemed savings and adjusted savings, also called a realization rate, is then applied to the population of participants to estimate program savings.

International Performance Measurement and Verification Protocol (IPMVP - Option C): The savings measurement approach defined in IPMVP Option C and ASHRAE Guideline 14 determines energy and demand savings through the use of whole-facility energy (end-use) data, which may be measured by utility meters or data loggers. This approach will involve the use of monthly utility billing data from a main meter for a twelve month period before and after the audit/install date, and adjust the savings estimates derived from engineering algorithms applied to the Company's program participation data. The adjustment factor, also called a realization rate, is then applied to the population of participants to estimate program savings. This approach may include regression analysis, particularly where weather-

[9] The IPMVP protocols and documentation were developed and maintained by the Efficiency Valuation Organization (EVO), which publishes the protocols and updates on their web site. http://www.evo-world.org/index.php?option=com_content&task=view&id=272&Itemid=279&lang=en

sensitive end uses are involved, to ensure that weather effects are accounted for and calibrated to test year or normalized for typical year. Company-specific customer usage data, which will be applied to actual participating households to quantify energy and peak demand savings.

International Performance Measurement and Verification Protocol (IPMVP - Option D): Savings are determined through simulation of the energy use of components or the whole facility ex-post (after measure implementation), with no pre-implementation base year data available (as with new construction programs). Simulation routines must be demonstrated to adequately model actual energy performance measured in the facility, utilizing carefully calibrated simulation. This would then be compared with modeled base year estimates, determined by deducting the DSM measures and calculating the base year energy use profile.

The current EKPC programs can be categorized into groups, according to their applicability to the IPMVP protocols. The decision to apply a particular protocol is based on the population of participants, the type of measure, whether it applies to specific equipment or a general system, and the rigor required to produce sufficient accuracy and precision to satisfy internal or regulatory requirements. The required degree of rigor will affect whether and how much metering will be required and the sample sizes used (where populations are significant and census monitoring is not feasible or cost-effective). The scenario analysis presented in this report is a reflection of the rigor of EM&V required, which will affect sample sizes, type of metering, and IPMVP Option.

5.3 EM&V Protocols for Existing EKPC Programs

To create EM&V protocols for EKPC's existing programs, we identified appropriate protocols. These include:

- RWB - Residential Whole Building Protocol - (IPMVP Option C)
- RAL - Residential Appliance & Lighting Protocol - (IPMVP Option B)
- RNC, CNC - Residential and C&I New Construction Protocols - (IPMVP Option D or IPMVP Option B)
- CWF - C&I Whole Facility - (IPMVP - Option C)
- CIE - C&I Equipment Protocol - (IPMVP - Option B)
- RDR, CDR - Demand Response Protocol - (IPMVP - Option B)

In the following, current EKPC programs are categorized by protocol type and contain a discussion of which IPMVP protocol is generally applicable, with scenario analysis following.

1. Residential Weatherization Programs (Button Up Weatherization, Button Up with Air Sealing, HVAC Duct Sealing Program) – These programs affect building envelope and transport media

rather than a specific end use or equipment, although certainly HVAC will be most affected. For ex-ante (pre-retrofit) estimates, current practice is application of engineering estimates, with some industry experience – specifically regional to reflect weather factors – used to develop deemed savings. Recommended protocols under most scenarios would include statistically-based billing analysis based on whole facility metering (at a minimum utility monthly meters, with interval facility metering for more rigorous scenarios). This would constitute IPMVP Option C. This whole facility metering analysis, defined as the Residential Whole Building Protocol (RWB), would generate savings estimates with measurable precision levels that could then be applied to the ex-ante estimates to develop realization rates (ratio of engineering to "actual" performance) and/or revised deemed savings tables, and could also include factors for additional variables that were determined as significant in the statistical modeling, including, for example, house type, vintage, geographic area, and demographics. Additional rigor for more stringent scenarios could include on-site verifications, spot metering, and end use metering.

2. Residential HVAC Equipment (Heat Pump Retrofit) – This program involves replacement of a specific end use equipment with a different type of equipment that provides the same function, presumable more efficiently. For ex-ante (pre-retrofit) estimates, current practice is application of engineering estimates, based on industry experience and equipment specifications (equipment efficiency ratings), which are used to develop deemed savings. Recommended protocols under most scenarios would include either statistically-based billing analysis based on whole facility metering with statistical modeling of the HVAC system (IPMVP Option A), or, assuming it can be isolated separate metering of the HVAC system (IPMVP Option B). This metered facility and end use analysis, included in the definition of Residential Appliance and Lighting Protocol (RAL), would generate savings estimates with measurable precision levels As with weatherization, realization rates and/or revised deemed savings estimates would result from the more stringent EM&V. In the case of heating and cooling for this measure, the relative magnitude of the end use compared with the overall residence usage and fuel will determine the precision and accuracy that can be achieved. For example, in a colder climate, gas heating where only heat and water heating are provided, can be more accurately modeled from the facility fuel-type meters than for electric cooling, where cooling is a lower percentage of facility energy usage. Additional rigor under more stringent scenarios could include a sample of end use metering points.

3. Residential Advanced LED Lighting – This program also involves replacement of specific end use equipment with a different type of equipment that provides the same function, presumable more efficiently. For ex-ante (pre-retrofit) estimates, current practice is application of engineering estimates, based on industry experience and equipment specifications (equipment/lighting efficiency ratings), which are used to develop deemed savings. Recommended protocols under most scenarios would include either engineering algorithms based on these efficiency ratings, combined with industry experience/assumptions on mitigating factors

that affect both overall (e.g. percentage of lighting equipment not applied/breakage) and coincidence factors affected by load shape parameters (e.g. when is lighting used). For A/C and water heating (potential future programs), circuits can typically be isolated, but lighting will typically require light loggers or other metering to isolate the loads for application of IPMVP Option B. This would be included in the definition of Residential Appliance and Lighting Protocol (RAL), which would generate savings estimates with measurable precision levels and realization rates and/or revised deemed savings estimates from the more stringent EM&V. Additional rigor under more stringent scenarios could include larger sample sizes and segmentation by key factors, such as demographics, home size/type and number of occupants.

4. Residential New Construction (TSE Home, TSE Manufactured Home Heat Retrofit) – For these measures, there is no replacement, so current protocol is for building energy simulation modeling, which will identify the incremental improvement attributed to a choice of more efficient measures and equipment vs. lesser efficient choices, based on total building modeling. Recommended protocols under most scenarios would include whole facility metering for TSE Home, with statistical modeling of the whole building or HVAC system (IPMVP Option D), for TSE Home Heat Retrofit or, assuming it can be isolated separate metering of the HVAC system (IPMVP Option B). This metered facility and end use analysis, included in the definition of Residential New Construction Protocol (RNC), would generate energy usage estimates that would then be compared to the ex-ante modeled levels and an applicable set of realization rates. Additional rigor under more stringent scenarios could include a larger sample of end use metering points, with segmentation and calculation of exogenous variable factors affecting realization rates, such as type of home and demographics.

5. Commercial/Industrial Advanced Lighting – This program involves replacement of a specific end use equipment with a different type of equipment that provides the same function, presumable more efficiently. For ex-ante (pre-retrofit) estimates, current practice is application of engineering estimates, based on industry experience and equipment specifications (lighting efficiency ratings), which are used to develop savings. Recommended protocols under most scenarios would include either engineering algorithms based on these efficiency ratings, combined with industry experience/assumptions on mitigating factors that affect both overall (e.g. percentage of lighting equipment not applied/breakage) and coincidence factors affected by load shape parameters (e.g. operating hours, business type). For some lighting retrofits, circuits can be isolated, but lighting may require light loggers or other metering to isolate the loads for application of IPMVP Option B. This would be included in the definition of Commercial and Industrial Equipment Protocol (CIE). This would generate savings estimates with measurable precision levels and realization rates. Additional rigor under more stringent scenarios could include larger sample sizes and segmentation by key factors, such as business/industry type.

6. Residential Demand Response (Residential $impleSaver for A/C and Water Heat Programs) This program involves partial or full interruption of the normal pattern of load based on a signal to the device during selected times of critical stress on the electric grid. Since the interruption can be scheduled at any time and may not constitute a significant portion of the whole facility/residence load, end use metering is the standard protocol for EM&V. The system and device used to curtail for demand response purposes may be either one-way or two-way, with two-way systems providing feedback that the signal was received and may also provide data on runtime that would enable the equivalent of end use metering. If not, as the case with the current EKPC program, the data on how many units were on or off or affected by the curtailment would have to be determined from a sample of participating devices. Periodic sampling and data analysis could be used to develop a weather-based (in the case of A/C) or – at least – seasonal estimate (for water heating) of typical load reduction impacts by time of day, duration of load reduction, and other factors/conditions (e.g. day of week, weather), as well as mitigating factors, such as overrides, where applicable. Recommended protocols would continue to be end use metering under IPMVP Option B, particularly since the specific end use equipment circuits can be isolated and would be included in the definition of Residential Demand Response (RDR), which would generate load reduction estimates with measurable precision levels and override rates. Additional rigor under more stringent scenarios could include larger sample sizes, upgrade of control equipment/systems to obtain real-time or, at least 2-way data transfer for more timely demand response impact estimates, sufficient for qualification under ISO or utility demand response incentive programs.

7. ETS Incentive Direct Load Control Program – This program involves replacement of standard heating equipment with a thermal storage system, capable of shifting usage fully to an off-peak period, as defined and stipulated in the program requirements. This would produce the equivalent of a full interruption of the normal pattern of load applicable to a demand response program operation. The standard operational control systems of this type of equipment typically includes the capability to schedule and record operating patterns, which would be required to properly assess the impacts, including assuring that any operation during the peak period was identified for rate pricing purposes. Therefore, end use metering is the standard protocol for EM&V. Since every unit would have the load recording capability, no sampling is required – a census sample is typical. Recommended protocols would continue to be end use metering under IPMVP Option B, particularly since the specific end use equipment circuits can be isolated, and would be included in the definition of Residential Demand Response (RDR), which would generate load reduction estimates with measurable precision levels and rates of "failure" when unplanned peak period usage occurs. Additional rigor under more stringent scenarios could include upgrade of control equipment/systems to obtain real-time data transfer for more timely demand response impact estimates, sufficient for qualification under ISO or local utility demand response incentive programs.

8. Commercial/Industrial Demand Response – This program involves participation by Commercial/Industrial customers over 50 kW who would agree to reduce their facility loads by a contracted level during selected times of critical stress on the electric grid, with 24 hours notice, confirmed by data communication via an installed smart meter. The savings measurement approach defined in IPMVP Option C determines demand reduction and any energy savings through the use of whole-facility metering data, which may be measured by utility meters or data loggers. This protocol is categorized as CDR (Commercial Demand Response). Where specific end use load control is used to achieve the reduction, end use metering (IPMVP Option B) may be preferable in order to provide more specific metering results, especially if/when the demand reduction is relatively small in relation to the overall facility meter being used.

9. Commercial/Industrial Interruptible – This program primarily involves industrial customers, who agree to reduce their facility loads by (or to) a contracted level during selected times of critical stress on the electric grid, with less than 24 hours notice, confirmed by data communication via real-time or near real-time load monitoring, with 15-minute or less interval length. The savings measurement approach defined in IPMVP Option C determines demand reduction and any energy savings through the use of whole-facility metering data, which may be measured by utility meters or data loggers. This protocol is categorized as CDR (Commercial Demand Response).

10. Commercial Whole Facility – Currently, EKPC does not offer a program applicable to this category, which would include commercial building weatherization. This would use a similar protocol to the Residential Weatherization program, with the protocol category of RWB replaced by CWF (Commercial Whole Facility). The main difference would be that segmentation by business/industry type would be a significant sampling factor.

The following section describes the application of the methods under the various scenarios to reflect anticipated PSC and PJM requirements.

5.4 Scenario Overview

To address the five scenarios (2 regulatory and 3 PJM) for each of the 10 EKPC programs being analyzed, we will present versions of each Protocol, with enhanced methods at a higher level of rigor and cost. The first scenario will include a complete description, number of projected participants, current and recommended EM&V Approach/Method and sampling strategy. Subsequent scenarios will address incremental EM&V approach, method and sampling strategies to accommodate the anticipated levels of rigor associated with applicable programs for those scenarios. Since, in most cases, rules and regulations have not yet been promulgated, this assessment would need to be reviewed again and revised, where applicable, to reflect those rules, including any regulatory and PJM requirements.

Table 5-2: Five Scenarios

Scenario	Type	Description
1	a. Regulatory (PSC)	i) If EKPC member(s) adopt a DSM surcharge
2	a. Regulatory (PSC)	ii) If Kentucky joins neighboring states to establish regional standards for EM&V requirements, including potential Technical Reference Manual (TRM).
3	b. PJM	i) EKPC only offers its DLC and interruptible programs into the PJM capacity auction
4	b. PJM	ii) EKPC decides to offer its other demand response programs (ETS, commercial A/Cs, pool pumps) into the PJM capacity auction.
5	b.. PJM	iii) EKPC decides to offer its energy efficiency programs into the PJM annual auctions.

Table 5-2 summarizes findings from our analysis of the five scenarios listed in Table 5-3

Table 5-3: Summary of EKPC Current Programs and Scenarios

EKPC DSM Program EM&V	Current EM&V	Scenarios				
		1. EKPC member(s) adopt a DSM surcharge	2. Kentucky joins regional Technical Reference Manual (TRM).	3. EKPC offers DLC and interruptible programs into PJM	4. EKPC offers ETS, comm. A/Cs, pool pumps into PJM	5. EKPC offers energy efficiency programs into PJM
RESIDENTIAL EE PROGRAMS						
Residential Weatherization						
1. Button Up Weatherization Program	Site specific field data and engineering estimates, combined with impact evaluation results for similar programs at other utilities	engineering-based savings estimates adjusted based on a sample of EKPC participants, with data collected via a tracking system	supplement engineering analysis with billing analysis for sample of homes in both button-up base, weatherization tiers and HVAC duct sealing programs would be used to .			Add sample subset of homes already included for billing analysis with heating and cooling end use metering
Button Up with Air Sealing						
Residential HVAC Equipment						
2. HVAC Duct Sealing Program	based on an ACEEE study showing % savings from similar programs with typical HVAC UECs and site-specific blower door results.	tracking database; engineering-based savings estimates adjusted based on sample of on-site metering and inspections				
3. Heat Pump Retrofit Program	simple engineering algorithms apply improved SEER and HSPF, with typical consumption for HP and resistance heat with CAC	tracking database and verification. Billing analysis on a sample to develop deemed savings.	subset of the billing analysis homes with end use metering to establish demand vs. energy patterns			
Residential New Construction						
4. TSE Home	compare engineering simulation model runs for standard practice homes with homes built to TSE standards.	Tracking database to collect home characteristics (size, usage, demographics, equipment inventory) to support improved load modeling.	Tracking data pooled with other regional data to establish deemed savings, with segmented data characteristics			More detailed energy data from whole building metering on a sample to establish demand-energy relationships
5. TSE Manufactured Home Heat Pump Retrofit						
6. Advanced Lighting Program (Unit = 1 bulb)	simple engineering algorithms use wattage and assumptions for lifetime, hours per day and net-to-gross ratios	sample surveys for hours per day and free riders; subset with light loggers. Industry lifetimes, In-service rates & free-ridership	Additional samples to improve precision and contribute to factors for TRM deemed savings and net-to-gross ratios.			Additional light logger samples to increase precision for energy to demand ratios for PJM critical days.

Table 5-3: Summary of EKPC Current Programs and Scenarios (Cont'd)

EKPC DSM Program EM&V	Current EM&V	Scenarios				
		1. EKPC member(s) adopt a DSM surcharge	2. Kentucky joins regional Technical Reference Manual (TRM).	3. EKPC offers DLC and interruptible programs into PJM	4. EKPC offers ETS, comm. A/Cs, pool pumps into PJM	5. EKPC offers energy efficiency programs into PJM
COMMERCIAL EE PROGRAMS						
7. Commercial Advanced Lighting	field data for connected load reductions combined with load profiles from 1990 Duke Power end-use metering study	sample inspections and surveys to ID hours per day and free riders; subset of light loggers; Industry data for lifetimes, in-service rates; net-to-gross	Additional samples to increase precision and contribute to the TRM deemed savings rates			Additional light logger samples to increase precision and develop energy to demand ratios to for PJM critical days
INDUSTRIAL EE PROGRAMS						
8. Compressed Air	Savings based on field data for connected load reductions combined with typical industrial EUIs and load profiles	Tracking database; customized estimates for each participant are recommended.	Short-term data loggers used to verify hours use; build deemed savings			Sample with longer-term data loggers to verify total hours use and PJM coincidence for demand-energy relationships
DEMAND RESPONSE PROGRAMS						
9. Commercial DR Program	No program participants yet; plan is for smart meter install for each site with data communications to determine compliance with contracted load reduction	No additional requirements other than reporting and documentation	No additional requirements other than reporting and documentation	real-time /next day impact estimates and reports for PJM; estimates by temperature and time	Possible upgrade to end use metering where applicable when end uses are specific target of demand response activity	
10. Commercial/Industrial Interruptible Program	Energy/peak savings and hourly load profiles for electric heating with and without ETS from 1996-1998 EKPC/EPRI /CRN end use metering	End Use Metering and updated instrumentation on a sample of participant homes to measure load profiles and estimate impacts	Additional end use samples on participants and non-participants for baseline	Reports and documentation for PJM		
11. ETS Incentive DR Program	Energy/peak savings and hourly load profiles for electric heating with and without ETS from 1996-1998 EKPC/EPRI /CRN end use metering	End Use Metering and updated instrumentation on a sample of participant homes to measure load profiles and estimate impacts	Additional end use samples on participants and non-participants for baseline		Upgrade end use metering on sample of homes to provide additional resolution (5/15 min.) and same/one-day data collection	
Residential: $impleSaver						
12. Air Conditioners	ongoing field M&V with end use metering samples: HOBO meters/data loggers collected by program admin (UPA) on a semi-annual basis	Detailed documentation and reporting of field data collection, including tracking database of participants, with surveyed characteristics.	Develop deemed savings and causal data factors for TRM	real-time /next day impact estimates and reports for PJM; estimates by temperature and time		
Water Heaters						

5.5 Scenario Analysis

5.5.1 Scenario 1: Regulatory (PSC)/DSM Surcharge

Generally, initiation of a DSM surcharge will provide additional funding for EKPC Owner-Members to formalize current data collection, develop a tracking database, and conduct more customer-specific data collection where not already being collected. Initially, evaluation of energy efficiency programs would include engineering analysis and limited end use metering only on the demand response programs. The implementation of a tracking database will be designed to standardized data collection, including the items to be collected, and provide a centralized database for analysis and reporting of participants and impacts. In the case of EKPC, since much of the data collection has been distributed among the Owner-Members, standardization and reporting is a key step to consolidating information for use in responding to PSC regularly and potential PJM reporting requirements.

The following table provides a summary of the programs and associated EM&V methods, along with the methods that would be recommended under the scenarios presented in the following sections.

Table 5-4: Button-up Weatherization Program, with Air Sealing Weatherization Tiers – Scenario 1

Criteria	Description
Program Summary	Installation of insulation materials and other weatherization techniques to reduce heat loss in the home.
Participants	Target 600 for 2013, including 250 with air sealing and 50-100 with weatherization Tiers
Current EM&V Approach	Savings are derived from site specific field data and engineering estimates, combined with impact evaluation results for similar programs at other utilities. Engineering calculations are produced using the REM RATE software program that his widely used in the building science industry. Assumes mix of furnace / central A/C and air-source heat pumps (ASHPs) weighted according to saturation in existing single-family homes (70% ASHP, 30% furnace/CAC).
Recommended EM&V Approach	The evaluation of this program will use engineering-based savings estimates that will be adjusted based on a sample of EKPC participants, with data collected via a tracking system on the specific mix of furnace/central A/C and air-source heat pumps (ASHPs). All installations will be verified.
EM&V Method	RWB

Table 5-5: HVAC Duct Sealing (Tune-Up) Program – Scenario 1

Criteria	Description
Program Summary	Duct sealing program. Reductions in duct losses are measured using a blower door test
Participants	Target 400 for 2013
Current EM&V Approach	Energy and peak savings are calculated based on an ACEEE study showing the % savings from similar programs along with typical HVAC UECs and site-specific blower door results. Program participant data (e.g. duct testing results, home size, heating system type) was used to check load forecast savings
Recommended EM&V Approach	The evaluation of this program will use engineering-based savings estimates that will be adjusted based on a sample of on-site metering and inspections to verify measure installation, type, and location. A representative sample of homes will be selected with this measure. All efficiency measures will be verified. Modified blower door subtraction testing will be performed on units within the range of the test equipment. Energy and demand savings will be calculated using static pressure and air volume metrics. In order to establish baselines for comparison, the evaluation will use the implementation contractor provided pre-duct sealing test values for select sample sites to establish the baseline followed by post-repair testing for comparison.
EM&V Method	RWB

Table 5-6: Residential Heat Pump Retrofit Program – Scenario 1

Criteria	Description
Program Summary	Encourages residential members to convert their primary heat source from electric resistance heat to an air source heat pump where the existing heating system is 10 years old or older. Homeowners applying for this incentive must install an air source heat pump that is equivalent to 13 SEER and 7.5 HSPF or higher for manufactured homes, and 14 SEER and 8.2 HSPF for stick built homes. The existing heating system must be 2 years or older to qualify for incentives.
Participants	Target 400 for 2013
Current EM&V Approach	Air Source Heat Pump replacing resistance heat savings are calculated by using simple engineering algorithms for improving SEER and HSPF combined with typical consumption for standard heat pumps and for resistance heating with central air conditioning

Recommended EM&V Approach	Program participant data (home, equipment and occupant characteristics) will be recorded in a tracking database and installations will be documented and verified. Billing analysis will be used on a sample of participant homes to establish segmented sample-specific energy savings for heating and cooling. From this, a set of deemed savings will be developed to apply to participant populations. Demand savings will be developed from regional end use studies that establish the demand-energy relationship specific to the EKPC coincident peak definitions.
EM&V Method	RAL
Sampling Strategy	Sample segmentation by home size/usage level and, to the extent possible, geographic area, will be developed to ensure that

Table 5-7: Touchstone Energy Home Program – Scenario 1

Criteria	Description
Program Summary	Encourages new homes to be built to higher standards for thermal integrity and equipment efficiency and high efficient heat pump systems. Measures include air sealing and insulation equivalent to 2009 IECC standards, with specific focus on completing the Thermal Bypass Checklist.
Participants	Target 150 for 2013
Current EM&V Approach	Savings are calculated by comparing engineering simulation model runs for standard practice homes with homes built to Touchstone Energy standards. Used ESPRE simulation (EPRI product) about 4-5 years ago, and currently uses REM Rate simulation
Recommended EM&V Approach	A tracking database would be used to collect home characteristics (size, usage, demographics, equipment inventory) to support improved load modeling.
EM&V Method	RNC

Table 5-8: Touchstone Energy Manufactured Home Program[10] – Scenario 1

Criteria	Description
Program Summary	All Electric manufactured home built to Touchstone Energy specifications.

[10] Program ending January 2013 and replaced by redesigned Heat Pump Retrofit program.

Participants	Target 2 for 2013
Current EM&V Approach	Savings are calculated by using the target savings percentage applied to typical new manufactured home consumption.
Recommended EM&V Approach	A tracking database would be used to collect home characteristics (size, usage, demographics, equipment inventory) to support improved load modeling.
EM&V Method	RNC

Table 5-9: Residential Advanced Lighting Program – Scenario 1

Criteria	Description
Program Summary	Offers incentives to residential customers to purchase and install high efficiency lighting, including CFLs and LEDS, in their homes.
Participants	Unit is 1 bulb; target 38,000 for 2013
Current EM&V Approach	Savings are calculated using simple engineering algorithms that use wattage, along with assumptions for lifetime in hours, hours per day and net-to-gross ratios
Recommended EM&V Approach	A sample of EKPC participant surveys to identify program/area-specific values for hours per day, along with a subset of light loggers to verify self-reported values, would be used to make the estimates more EKPC-specific. Industry lifetimes would be sufficient. In-service rates and free-ridership would be established from surveys and a sample of inspections to establish net-to-gross ratios.
EM&V Method	RAL

Table 5-10: Commercial Advanced Lighting Program – Scenario 1

Criteria	Description
Program Summary	Offers incentives to commercial and industrial customers to install high efficiency lamps and ballasts in their facilities, including LED exit signs, T-5 fluorescent fixtures, and advanced controls.
Participants	Target 35 for 2013
Current EM&V Approach	Savings are based on field data for connected load reductions combined with typical commercial lighting EUIs and load profiles (c. 1990 baseline data on commercial lighting load profile from Duke Power end-use metering study)

Recommended EM&V Approach	A sample of EKPC participant surveys to identify program/area-specific values for hours per day, along with a subset of light loggers to verify self-reported values, would be used to make the estimates more EKPC-specific. Industry lifetimes would be sufficient. In-service rates and free-ridership would be established from surveys and a sample of inspections to establish net-to-gross ratios.
EM&V Method	CIE
Notes	Given the relatively small program participant populations, samples would be more judgmental, with business type segmentation a critical sampling strategy.

Table 5-11: Industrial Compressed Air Program – Scenario 1

Criteria	Description
Program Summary	This program is designed to reduce electricity consumption through a comprehensive approach to efficient production and delivery of compressed air in industrial facilities, including (1) training of plant staff; (2) a detailed system assessment of the plant's compressed air system including written findings and recommendations, and (3) incentives for capital-intensive improvements. EKPC conducts an ultrasonic compressed air leakage audit and a follow-up audit to measure the difference in the kW leakage load. Rebates paid based on the difference in the kW leakage load.
Participants	Target 2 for 2013
Current EM&V Approach	Savings are based on field data for connected load reductions combined with typical industrial EUIs and load profiles.
Recommended EM&V Approach	Given the small participant populations, customized estimates for each participant are recommended. Tracking database used.
EM&V Method	CIE
Sampling Strategy	If/when participant totals become significant, some sampling may be warranted.

Table 5-12: Electric Thermal Storage Incentive Program – Scenario 1

Criteria	Description
Program Summary	Provides retail members with a cost-efficient means of using electricity for space heating. A discounted rate for ETS energy encourages retail members to use electricity for heating during off peak hours, with a potential for use

	as a demand response program.
Participants	Target 70 for 2013
Current EM&V Approach	Energy and peak savings as well as hourly load profiles for electric heating with and without ETS are derived from a detailed end use metering study conducted by EKPC with EPRI and CRN in the 1996-1998 time period.
Recommended EM&V Approach	End Use Metering and updated instrumentation on a sample of homes to measure load profiles and impacts
EM&V Method	CDR
Sampling Strategy	Minimum of 20 homes, scaled up as participation population increases to 40-50, depending on variation in
Notes	The cumulative changes in building structures, usage patterns and other factors over the past 15 years should call for an updated load study.

Table 5-13: Residential Demand Response Direct Load Control Program – Scenario 1

Criteria	Description
Program Summary	Direct load control of air conditioners and water heaters to reduce demand and energy usage through the installation of load control devices. Peak demand reduction is accomplished by cycling equipment according to a predetermined control strategy, typically over 4 hours. Central air conditioning and heat pump units are cycled on and off, while water heater loads are curtailed through a 3rd-party administrator Utility Partners of America or UPA provides installation and service calls, and GoodCents™ provides measurement & verification services). Participating customers receive an annual bill credit incentive ($10 per year for each water heater under control, and $20 per year for each air conditioner).
Participants	Target 4,000 A/Cs and 2,500 Water Heaters in 2013; 45,000 homes that contribute a total of 50,000 air conditioners and 27,000 water heaters over the next seven years. Pool pumps will be add-on devices.
Current EM&V Approach	Summer and winter peak savings are based on ongoing M&V in the field using continuous data collection of customer samples with end use metering, HOBO meters and data loggers collected by program administrator (UPA) on a semi-annual basis.
Recommended EM&V Approach	More detailed documentation and reporting of field data collection, including tracking database of participants, with surveyed characteristics.
EM&V Method	RDR

5.5.2 Scenario 2: Regulatory/PSC – Regional EM&V Standards

Scenario 2: a. Regulatory/KPSC – (ii) If Kentucky joins neighboring states to establish regional standards for EM&V requirements, including potential Technical Reference Manual (TRM).

Regional standards for EM&V requirements, particularly the planned adoption of a Technical Reference Manual (TRM), will generally further formalize the EM&V process, provide the potential for deemed savings for cases where other regional utilities are/will conduct more comprehensive EM&V data collection, and provide more opportunities for regional or shared EM&V data research and standards for program parameters. Evaluation methods under this scenario will generally include billing analysis and some level of sample end use load shape library development via borrowed or limited end use metering to establish ratios of annual energy impacts to coincident peak demand impacts.

Table 5-14: Button-up Weatherization Program, with Air Sealing Weatherization Tiers – Scenario 2

Criteria	Description
Program Summary	Installation of insulation materials and other weatherization techniques to reduce heat loss in the home.
Participants	Target 600 for 2013, including 250 with air sealing and 50-100 with weatherization Tiers
Current EM&V Approach	Savings are derived from site specific field data and engineering estimates, combined with impact evaluation results for similar programs at other utilities. Engineering calculations are produced using the REM RATE software program that his widely used in the building science industry. Assumes mix of furnace / central A/C and air-source heat pumps (ASHPs) weighted according to saturation in existing single-family homes (70% ASHP, 30% furnace/CAC).
Recommended EM&V Approach	Billing analysis for a sample of homes that participate in any of the both the button-up base, weatherization tiers and HVAC duct sealing programs would be used to supplement the engineering analysis.
EM&V Method	RWB

Table 5-15: HVAC Duct Sealing (Tune-Up) Program – Scenario 2

Criteria	Description
Program Summary	Coil cleaning and other maintenance measures combined with sealing of ductwork. Reductions in duct losses are measured using a blower door test
Participants	Target 400 for 2013
Current EM&V Approach	Energy and peak savings are calculated based on an ACEEE study showing the % savings from similar programs along with typical HVAC UECs and site-specific blower door results. Program participant data (e.g. duct testing results, home size, heating system type) was used to check load forecast savings
Recommended EM&V Approach	Billing analysis for a sample of homes that participate in any of the both the button-up base, weatherization tiers and HVAC duct sealing programs would be used to supplement the engineering analysis. Deemed savings estimates from the TRM will be updated to reflect each year's participant complement
EM&V Method	RWB
Sampling Strategy	Samples segmented to reflect key variables will be established and deemed

Criteria	Description
	savings categories will be developed to reflect key statistically significant factors.

Table 5-16: Residential Heat Pump Retrofit Program – Scenario 2

Criteria	Description
Program Summary	Encourages residential members to convert their primary heat source from electric resistance heat to an air source heat pump where the existing heating system is 10 years old or older. Homeowners applying for this incentive must install an air source heat pump that is equivalent to 13 SEER and 7.5 HSPF or higher for manufactured homes, and 14 SEER and 8.2 HSPF for stick built homes. The existing heating system must be 2 years or older to qualify for incentives.
Participants	Target 400 for 2013
Current EM&V Approach	Air Source Heat Pump replacing resistance heat savings are calculated by using simple engineering algorithms for improving SEER and HSPF combined with typical consumption for standard heat pumps and for resistance heating with central air conditioning
Recommended EM&V Approach	In addition to billing analysis on a sample of homes, a subset of the billing analysis homes will include end use metering to establish demand vs. energy patterns for baseline and treated/installed homes.
EM&V Method	RAL

Table 5-17: Touchstone Energy Home Program – Scenario 2

Criteria	Description
Program Summary	Encourages new homes to be built to higher standards for thermal integrity and equipment efficiency and high efficient heat pump systems. Measures include air sealing and insulation equivalent to 2009 IECC standards, with specific focus on completing the Thermal Bypass Checklist.
Participants	Target 150 for 2013
Current EM&V Approach	Savings are calculated by comparing engineering simulation model runs for standard practice homes with homes built to Touchstone Energy standards. Used ESPRE simulation (EPRI product) about 4-5 years ago, and currently uses REM Rate simulation
Recommended EM&V	Data for this program in tracking database would be pooled with other

Criteria	Description
Approach	regional data to establish deemed savings, including segmented factors such as geographic area and other data characteristics collected from the scenario 1 efforts.
EM&V Method	RNC

Table 5-18: Touchstone Energy Manufactured Home[11] Program – Scenario 2

Criteria	Description
Program Summary	All Electric manufactured home built to Touchstone Energy specifications.
Participants	Target 2 for 2013
Current EM&V Approach	Savings are calculated by using the target savings percentage applied to typical new manufactured home consumption.
Recommended EM&V Approach	Data for this program in tracking database would be pooled with other regional data to establish deemed savings, including segmented factors such as geographic area and other data characteristics collected from the scenario 1 efforts.
EM&V Method	RNC

Table 5-19: Residential Advanced Lighting Program – Scenario 2

Criteria	Description
Program Summary	Offers incentives to residential customers to purchase and install high efficiency lighting, including CFLs and LEDS, in their homes.
Participants	Unit is 1 bulb; target 38,000 for 2013
Current EM&V Approach	Savings are calculated using simple engineering algorithms that use wattage, along with assumptions for lifetime in hours, hours per day and net-to-gross ratios
Recommended EM&V Approach	Additional samples would be used to increase precision and contribute to the TRM deemed savings rates, including free-riders, in-service rates, and net-to-gross ratios.
EM&V Method	RAL

[11] Program ending January 2013.

Table 5-20: Commercial Advanced Lighting Program – Scenario 2

Criteria	Description
Program Summary	Offers incentives to commercial and industrial customers to install high efficiency lamps and ballasts in their facilities, including LED exit signs, T-5 fluorescent fixtures, and advanced controls.
Participants	Target 35 for 2013
Current EM&V Approach	Savings are based on field data for connected load reductions combined with typical commercial lighting EUIs and load profiles (c. 1990 baseline data on commercial lighting load profile from Duke Power end-use metering study)
Recommended EM&V Approach	Additional samples would be used to increase precision and contribute to the TRM deemed savings rates, including free-riders, in-service rates, and net-to-gross ratios.
EM&V Method	CIE

Table 5-21: Industrial Compressed Air Program – Scenario 2

Criteria	Description
Program Summary	This program is designed to reduce electricity consumption through a comprehensive approach to efficient production and delivery of compressed air in industrial facilities, including (1) training of plant staff; (2) a detailed system assessment of the plant's compressed air system including written findings and recommendations, and (3) incentives for capital-intensive improvements. EKPC conducts an ultrasonic compressed air leakage audit and a follow-up audit to measure the difference in the kW leakage load. Rebates paid based on the difference in the kW leakage load.
Participants	Target 2 for 2013
Current EM&V Approach	Savings are based on field data for connected load reductions combined with typical industrial EUIs and load profiles.
Recommended EM&V Approach	Short-term data loggers used to verify hours use and build deemed savings database
EM&V Method	CIE

Table 5-22: Electric Thermal Storage Incentive Program – Scenario 2

Criteria	Description
Program Summary	Provides retail members with a cost-efficient means of using electricity for space heating. A discounted rate for ETS energy encourages retail members to use electricity for heating during off peak hours, with a potential for use as a demand response program.
Participants	Target 70 for 2013
Current EM&V Approach	Energy and peak savings as well as hourly load profiles for electric heating with and without ETS are derived from a detailed end use metering study conducted by EKPC with EPRI and CRN in the 1996-1998 time period.
Recommended EM&V Approach	Additional end use samples on participants and non-participants for baseline
EM&V Method	CDR
Sampling Strategy	Minimum of 20 homes, scaled up as participation population increases to 40-50, depending on variation in
Notes	The cumulative changes in building structures, usage patterns and other factors over the past 15 years should call for an updated load study.

Table 5-23: Residential Demand Response Direct Load Control Program – Scenario 2

Criteria	Description
Program Summary	Direct load control of air conditioners and water heaters to reduce demand and energy usage through the installation of load control devices. Peak demand reduction is accomplished by cycling equipment according to a predetermined control strategy, typically over 4 hours. Central air conditioning and heat pump units are cycled on and off, while water heater loads are curtailed through a 3rd party administrator (UPA), who provide installation, service calls, and measurement & verification services. Participating customers receive an annual bill credit incentive ($10 per year for each water heater under control, and $20 per year for each air conditioner).
Participants	Target 4,000 A/C's and 2,500 Water Heaters in 2013; 45,000 homes that contribute a total of 50,000 air conditioners and 27,000 water heaters over the next seven years. Pool pumps will be add-on devices.
Current EM&V Approach	Summer and winter peak savings are based on ongoing M&V in the field using continuous data collection of customer samples with end use metering, HOBO meters and data loggers collected by program

Criteria	Description
	administrator (UPA) on a semi-annual basis.
Recommended EM&V Approach	Develop deemed savings estimates, including causal factors from surveyed data characteristics for TRM
EM&V Method	RDR

5.5.3 Scenario 3: PJM/EKPC Only Bids Current DLC, DR and Interruptible Programs

Scenario 3: b. PJM – (i) EKPC only offers its DLC, DR and interruptible programs into the PJM capacity auction

Generally, EM&V for DLC/DR and interruptible programs under PJM are similar to the current approach that EKPC utilizes under its residential program for air conditioners and water heaters (under the UPA program administration). More specific participation tracking and documentation would be required than the present methods. Continued use of direct measurement (IPMVP Option B or C) should be sufficient, in terms of overall approach, although the effect of application of PJM requirements on reporting frequency, sample sizes (for residential and possibly small commercial) and required precision and accuracy must be determined.

Table 5-24: Residential Demand Response Direct Load Control Program – Scenario 3

Criteria	Description
Program Summary	Direct load control of air conditioners and water heaters to reduce demand and energy usage through the installation of load control devices. Peak demand reduction is accomplished by cycling equipment according to a predetermined control strategy, typically over 4 hours. Central air conditioning and heat pump units are cycled on and off, while water heater loads are curtailed through a third-party administrator (UPA), who provide installation, service calls, and measurement & verification services. Participating customers receive an annual bill credit incentive ($10 per year for each water heater under control, and $20 per year for each air conditioner).
Participants	Target 4,000 A/C's and 2,500 Water Heaters in 2013; 45,000 homes that contribute a total of 50,000 air conditioners and 27,000 water heaters over the next seven years. Pool pumps will be add-on devices.

Criteria	Description
Current EM&V Approach	Summer and winter peak savings are based on ongoing M&V in the field using continuous data collection of customer samples with end use metering, HOBO meters and data loggers collected by program administrator (UPA) on a semi-annual basis.
Recommended EM&V Approach	The UPA administrators currently provide a turnkey service and report, but will likely need to provide (or EKPC will) more formalized documentation of impact methods and calculations, real-time /next day impact estimates, measurable precision estimates and reports conforming with PJM requirements. PJM currently provides deemed savings based on unit sizes and temperatures which can be replaced with PJM member-specific estimates, which EKPC should consider. EKPC-specific estimates must include a table by temperature and time, not currently developed and reported.
EM&V Method	RDR

Table 5-25: Commercial Demand Response Direct Load Control Program – Scenario 3

Criteria	Description
Program Summary	Commercial/Industrial customers agree to reduce their facility loads by a contracted level during selected times of critical stress on the electric grid, with 24 hours notice, confirmed by data communication via an installed smart meter.
Participants	New program for 2012; Customers greater than 50 kW; 5700 kW in 2013
Current EM&V Approach	Smart Meter provides on-demand meter reading with interval resolution to confirm contracted demand response
Recommended EM&V Approach	Additional reporting and documentation for PJM compliance; potentially real-time data access
EM&V Method	CDR

Table 5-26: Commercial/Industrial Interruptible Program – Scenario 3

Criteria	Description
Program Summary	Commercial/Industrial customers agree to reduce their facility loads by/to a contracted level during selected times of critical stress on the electric grid, with under 24 hours notice, confirmed by real-time data communication with 15-minute or less resolution

Criteria	Description
Participants	7 participants in 2012, including one with over 90% of total impacts
Current EM&V Approach	Real-time metering provides 15-minute or less interval resolution to confirm contracted demand response
Recommended EM&V Approach	Additional reporting and documentation for PJM compliance; potentially real-time data access
EM&V Method	CDR

Other Programs are not applicable to this scenario, so methods and budgets would not be affected.

5.5.4 Scenario 4: PJM/EKPC Offers Other Direct Load Control Programs into PJM Capacity Auction

Scenario 4: b. PJM – (ii) - EKPC offers its other demand response programs (ETS, commercial A/Cs, pool pumps) into the PJM capacity auction.

Generally, the submittal of demand response programs into RTO incentive programs or capacity auctions requires a similar methodology to that of standard demand response program approaches already described in Scenario 1 or 2.

Table 5-25: Electric Thermal Storage Incentive Program – Scenario 4

Criteria	Description
Program Summary	Provides retail members with a cost-efficient means of using electricity for space heating. A discounted rate for ETS energy encourages retail members to use electricity for heating during off peak hours, with a potential for use as a demand response program.
Participants	Target 70 for 2013
Current EM&V Approach	Energy and peak savings as well as hourly load profiles for electric heating with and without ETS are derived from a detailed end use metering study conducted by EKPC with EPRI and CRN in the 1996-1998 time period.
Recommended EM&V Approach	Upgrade end use metering on a sample of homes to provide additional resolution (5/15 min.) and same/one-day data collection
EM&V Method	CDR
Sampling Strategy	Minimum of 20 homes, scaled up as participation population increases to 40-50, depending on variation in participant population

Criteria	Description
Notes	The cumulative changes in building structures, usage patterns and other factors over the past 15 years should call for an updated load study.

Other Programs are not applicable to this scenario, so methods and budgets would not be affected.

5.5.5 Scenario 5: PJM/EKPC Offers EE Programs into PJM Annual Auctions

Scenario 5: b. PJM – (iii) - EKPC offers its energy efficiency programs into the PJM annual auctions

Generally, the submittal of energy efficiency programs into RTO incentive programs requires a higher level of precision and accuracy than the requirements under standard energy efficiency regulatory programs, primarily because the impacts for specific hours and day types per season must be calculated. These types of impacts typically require a baseline definition, including hourly load estimates for baseline days comparable to RTO curtailment days, and hourly impact estimates that require precision at the hourly level.

Table 5-26: Button-up Weatherization Program, with Air Sealing Weatherization Tiers – Scenario 5

Criteria	Description
Program Summary	Installation of insulation materials and other weatherization techniques to reduce heat loss in the home.
Participants	Target 600 for 2013, including 250 with air sealing and 50-100 with weatherization Tiers
Current EM&V Approach	Savings are derived from site specific field data and engineering estimates, combined with impact evaluation results for similar programs at other utilities. Engineering calculations are produced using the REM RATE software program that his widely used in the building science industry. Assumes mix of furnace / central A/C and air-source heat pumps (ASHPs) weighted according to saturation in existing single-family homes (70% ASHP, 30% furnace/CAC).
Recommended EM&V Approach	In addition to regression analysis for estimation of energy savings for a sample of homes, a sample subset of homes already included for billing analysis would have heating and cooling end use metering designed to better establish demand-energy relationships.

Criteria	Description
EM&V Method	RWB
Sampling Strategy	End use metering sample would be a subset of the billing analysis sample

Table 5-27: HVAC Duct Sealing (Tune-Up) Program – Scenario 5

Criteria	Description
Program Summary	Coil cleaning and other maintenance measures combined with sealing of ductwork. Reductions in duct losses are measured using a blower door test
Participants	Target 400 for 2013
Current EM&V Approach	Energy and peak savings are calculated based on an ACEEE study showing the % savings from similar programs along with typical HVAC UECs and site-specific blower door results. Program participant data (e.g. duct testing results, home size, heating system type) was used to check load forecast savings
Recommended EM&V Approach	In addition to regression analysis for estimation of energy savings for a sample of homes, a sample subset of homes already included for billing analysis would have heating and cooling end use metering designed to better establish demand-energy relationships.
EM&V Method	RWB
Sampling Strategy	End use metering sample would be a subset of the billing analysis sample

Table 5-28: Residential Heat Pump Retrofit Program – Scenario 5

Criteria	Description
Program Summary	Encourages residential members to convert their primary heat source from electric resistance heat to an air source heat pump where the existing heating system is 10 years old or older. Homeowners applying for this incentive must install an air source heat pump that is equivalent to 13 SEER and 7.5 HSPF or higher for manufactured homes, and 14 SEER and 8.2 HSPF for stick built homes. The existing heating system must be 2 years or older to qualify for incentives.
Participants	Target 400 for 2013
Current EM&V Approach	Air Source Heat Pump replacing resistance heat savings are calculated by using simple engineering algorithms for improving SEER and HSPF combined with typical consumption for standard heat pumps and for resistance heating with central air conditioning

Criteria	Description
Recommended EM&V Approach	For use in submittals to PJM capacity auction, end use samples will be expanded, both in terms of sample size (and increased precision) and capability to recover interval data on a next-day (or better) basis, which will enable more timely impact estimates specific to conditions on PJM curtailment days.
EM&V Method	RAL
Sampling Strategy	End use sample sizes will be increased from scenario 2 levels to accommodate PJM requirements.

Table 5-29: Touchstone Energy Home Program – Scenario 5

Criteria	Description
Program Summary	Encourages new homes to be built to higher standards for thermal integrity and equipment efficiency and high efficient heat pump systems. Measures include air sealing and insulation equivalent to 2009 IECC standards, with specific focus on completing the Thermal Bypass Checklist.
Participants	Target 150 for 2013
Current EM&V Approach	Savings are calculated by comparing engineering simulation model runs for standard practice homes with homes built to Touchstone Energy standards. Used ESPRE simulation (EPRI product) about 4-5 years ago, and currently uses REM Rate simulation
Recommended EM&V Approach	More detailed energy data from whole building metering on a sample of homes would be used to establish demand-energy relationships and enable estimates of demand impacts during PJM curtailment days.
EM&V Method	RNC
Sampling Strategy	Sample of homes would have whole-building metering

Table 5-30: Touchstone Energy Manufactured Home[12] Program – Scenario 5

Criteria	Description
Program Summary	All Electric manufactured home built to Touchstone Energy specifications.

[12] Program ending January 2013 and replaced by redesigned Heat Pump Retrofit program.

Criteria	Description
Participants	Target 2 for 2013
Current EM&V Approach	Savings are calculated by using the target savings percentage applied to typical new manufactured home consumption.
Recommended EM&V Approach	More detailed energy data from whole building metering on a sample of homes would be used to establish demand-energy relationships and enable estimates of demand impacts during PJM curtailment days.
EM&V Method	RNC
Sampling Strategy	Sample of homes would have whole-building metering, subject to constraints on the population (due to small population).

Table 5-31: Residential Advanced Lighting Program – Scenario 5

Criteria	Description
Program Summary	Offers incentives to residential customers to purchase and install high efficiency lighting, including CFLs and LEDS, in their homes.
Participants	Unit is 1 bulb; target 38,000 for 2013
Current EM&V Approach	Savings are calculated using simple engineering algorithms that use wattage, along with assumptions for lifetime in hours, hours per day and net-to-gross ratios
Recommended EM&V Approach	Additional light logger samples would be used to increase precision and develop improved estimates of energy to demand ratios to apply to the statistically-adjusted engineering estimates of annual energy so as to better estimate lighting impact contributions at specific PJM critical days.
EM&V Method	CNC

Table 5-32: Commercial Advanced Lighting Program – Scenario 5

Criteria	Description
Program Summary	Offers incentives to commercial and industrial customers to install high efficiency lamps and ballasts in their facilities, including LED exit signs, T-5 fluorescent fixtures, and advanced controls.
Participants	Target 35 for 2013
Current EM&V Approach	Savings are based on field data for connected load reductions combined with typical commercial lighting EUIs and load profiles (c. 1990 baseline data on commercial lighting load profile from Duke Power end-use

Criteria	Description
	metering study)
Recommended EM&V Approach	Additional light logger samples would be used to increase precision and develop improved estimates of energy to demand ratios to apply to the statistically-adjusted engineering estimates of annual energy so as to better estimate lighting impact contributions at specific PJM critical days.
EM&V Method	CIE
Sampling Strategy	Sample segmentation by business type is critical to accurate estimates. Measurable precision by business type is recommended.

Table 5-33: Industrial Compressed Air Program – Scenario 5

Criteria	Description
Program Summary	This program is designed to reduce electricity consumption through a comprehensive approach to efficient production and delivery of compressed air in industrial facilities, including (1) training of plant staff; (2) a detailed system assessment of the plant's compressed air system including written findings and recommendations, and (3) incentives for capital-intensive improvements. EKPC conducts an ultrasonic compressed air leakage audit and a follow-up audit to measure the difference in the kW leakage load. Rebates paid based on the difference in the kW leakage load.
Participants	Target 2 for 2013
Current EM&V Approach	Savings are based on field data for connected load reductions combined with typical industrial EUIs and load profiles.
Recommended EM&V Approach	Sample with longer-term data loggers installed to verify both total hours use and coincidence for use in more accurately establishing the demand-energy relationships needed to estimate typical contribution to peak during PJM curtailments by industry type.
EM&V Method	CIE
Sampling Strategy	Sample should reflect variation by industry type and operating hours (obtained through surveys)

Programs 8 and 9 have already been covered under Scenario 4. These include: Electric Thermal Storage Incentive Program and the Residential Demand Response Direct Load Control Program.

6. Additional Scenarios

In addition to the five scenarios requested for investigation by EKPC, DNV KEMA presents three additional scenarios for consideration by the company as it pursues an enhanced EM&V process.

- Scenario 6 – Business-As-Usual
- Scenario 7 – Baseline Study
- Scenario 8 – DSM Tracking System

These are discussed in more detail below.

6.1 Scenario 6: Business-As-Usual

There is much to be said for maintaining the evaluation effort at current levels, for the energy efficiency programs until such time as participation levels and/or regulatory requirements demand otherwise. Reasons are:

- The methods that have been used are following industry-accepted guidelines;
- The recent NRECA report supports the methods being used for EKPC as preferable to forthcoming DOE Uniform Methods Protocols due to the high cost of the latter
- Participation levels are not high enough to justify the immediate investment, but suggest a more gradual transition over time.

Enhancements that would be advisable for EKPC to consider in the meantime include:

1. Assignment of a dedicated technical staff person to be trained and made responsible for DSM evaluation and conduct some of the basic analysis (i.e., benefit- cost calculations) in house.

2. Augment the data collected on program participants from members to enhance the information available for evaluation going forward. Revise the web-based input sheets for members to fill out with the additional data. At minimum, collect customer account numbers and contact information (phone numbers and mailing addresses).

3. Review billing data collection practices for an enhanced EM&V effort and put in place a system for collecting billing data from Owner-Members and conduct a pilot test for its transfer. This may involve execution of non-disclosure agreements.

Two additional enhancements for preparing for more rigorous EM&V are described in Scenarios 6 and 7 – conducting a DSM Baseline Study and development of a DSM Tracking System.

6.2 Scenario 7: DSM Baseline Study

It is important for accurate estimation of energy savings to have a strong foundation of baseline data from which to compare before and after energy usage and demand reductions. Some programs collect these data as part of the program implementation process – for example, if an energy audit is conducted, one can estimate the energy usage level before installation of measures. For Direct Load Control programs, one can examine a similar period before curtailment as the baseline. For most evaluations, however, it is useful to have a strong characterization of the population in terms of building and equipment characteristics prior to participation in energy efficiency programs, to serve as a measure of preconditions.

EKPC currently does not have a recent appliance saturation or equipment saturation database of customers of the Owner-Members for this purpose. We recommend that these data be developed through two primary data collection activities:

1. A Residential Baseline Survey – A mail survey to residential customers to augment data on housing type, building shell characteristics, appliance holdings and characteristics, by expanding questions on the presence of energy efficiency measures, efficiency levels of equipment, building shell characteristics and attitudes and intentions toward energy efficiency.

2. A Commercial and Industrial Baseline Survey – A telephone survey of businesses and institutional customers in the service territory to capture data on facility type and square footage equipment holdings and usage patterns, presence of energy efficiency measures, and attitudes and intentions toward usage and energy efficiency.

These studies should be refreshed periodically as the economy and external conditions change, typically every three to 5 years. The surveys would be statistically designed to render accurate information at the class level, and perhaps by segment (electric heat versus non-electric heat, or low, medium and high usage).

Plans for conducting a baseline market survey for EKPC's Owner-Members are provided below. The purpose of this study is to gather baseline data on residential appliance saturation, commercial and industrial equipment saturation as well as measure people's attitudes and willingness to participate in energy efficient and demand response programs in general. At this time there is no historical data that can be used to explicitly optimize a survey design for this study. So we designed this study so that generic estimates computed from the respondent data would be relatively precise for the different subgroups of interest.

For this market study, the subgroups of primary interest are:

- Residential Consumers

- Commercial and Industrial Consumers, ≤ 1,000 KVA (Small C&I Consumers)
- Commercial and Industrial Consumers, > 1,000 KVA (Large C&I Consumers)
- Total Commercial and Industrial (C&I) Consumers
- Total Consumers (Residential and C&I)

The latter two subgroups are the logical aggregates of the top three.

We propose to select this sample using a stratified, systematic sampling approach. The sample will be selected from a sample frame constructed from the billing record files maintained by the EKPC Owner-Members. There are 16 Owner-Members represented on these file(s). The explicit strata in this design will be:

- Residential Consumers
- Small C&I Consumers
- Large C&I Consumers

Within each stratum, the frame will be sorted by Owner-Member and a random, systematic sample will be selected. By systematically selecting the sample in this manner, the 16 Owner-Members become implicit strata in the design, within each of the three main explicit strata noted above. [13]

Table 6-1 displays the number of completed cases (respondents) we are designing this study to obtain and **Table 6-2** summarizes the sample frame and the expected distribution of the respondents across the implicit strata in the design, i.e. the 16 Owner-Members.

[13] Implicit strata are similar to explicit strata in survey sampling – the difference is we explicitly control the sample size in "explicit" strata whereas we can only predict what the sample size would be in "implicit" strata. Implicit strata are introduced in a design to in order to get a representative sample across the implicit stratification variables while maintaining as much precision as possible in estimates from each of the explicit strata.

Table 6-1: Sample Sizes and Expected Precision by Explicit Strata and Subgroups of Interest

Strata	Completed Sample Size	Response Rate	Selected Sample	Maximum Half Width on 90% Confidence Intervals For Estimates Near				
				10%	25%	50%	75%	90%
Residential Consumers	668	25%	2,672	2.1%	3.0%	3.5%	3.0%	2.1%
Commercial and Industrial ≤ 1000 KVA Consumers	500	25%	2,000	2.4%	3.5%	4.0%	3.5%	2.4%
Commercial and Industrial > 1000 KVA Consumers	32	25%	129	8.3%	11.9%	13.8%	11.9%	8.3%
Total Commercial	**532**		**2,129**	**2.4%**	**3.4%**	**4.0%**	**3.4%**	**2.4%**
Total Sample	**1,200**		**4,801**	**2.0%**	**2.8%**	**3.3%**	**2.8%**	**2.0%**

In summary:

- The study is designed to obtain 1,200 completed responses. The sample is allocated to the explicit strata as follows:
  - 668 Residential consumers
  - 500 Small C&I consumers
  - 32 Large C&I consumers
- We are assuming an overall response rate of 25%, most likely from a phone survey. Given this assumption, we will select 2672, 2000 and 129 consumers from the above three groups respectively. This results in a total selected sample size of 4,801. Notice from **Table 6-2** that there are 129 Large C&I consumers on the sample frame. We plan to select all of them for this study.
- From **Table 6-1**, for estimates around 50% from this study, we would expect the 90% confidence interval half widths in the explicit strata to be:
  - +/- 3.5% for the Residential consumers
  - +/- 4.0% for the Small C&I consumers
  - +/- 13.8% for the Large C&I consumers

The **confidence interval half width** is the statistical term for the "+/-" margin that one typically sees associated with newspaper and television polls. Strictly speaking, it means that if one were to repeat the survey a very large number of times, each time forming a confidence interval with the respondent data, than approximately 90% of the time the confidence intervals will cover the true prevalence we are trying to estimate. In summary, it's a measure of how precise the estimates are. So for the residential consumers (for example), we expect the confidence intervals around prevalences of 50% to be:

50% +/- 3.5% or
(50%-3.5%, 50%+3.5%) or
(46.5%, 53.5%)

- The larger confidence interval half width associated with Large C&I consumers is due to non-response. We plan to select all the Large C&I consumers and we will follow-up with these companies to extent the budget will allow in order to maximize the response rate from this group. As the number of respondents in this group (and any group for that matter) increases, the width of the confidence interval will be reduced.

- Table 6-1 demonstrates that we expect the estimates at around 50% will have a confidence interval half width of 4.0% for the total C&I group and 3.3% for the total sample.

- Table 6-1 also displays the confidence interval half width is less for any group for estimates near 10% and 25%. And the confidence interval half width for the 75% and 90% prevalences are the same as they are for the 10% and 25% prevalences. This is due to the symmetry of the variance associated with percent estimates.

- Table 6-2 illustrates the expected number of completed cases we will have in each of the 16 Owner-Members. The completed sample size is expected to range from 28 to 161. Although we are not designing the survey to yield precise estimates for the individual Owner-Members, note that we are expecting the respondent sample size to be greater than 100 in 5 of the 16 Owner-Members. A sample size of 100 is sufficient to form *relatively* precise estimates with. With a respondent sample size of 100, we would expect the confidence interval half widths associated with estimates of 50% to be around 5.5%.

Table 6-2: Summary of Population and Expected Respondent Sample by Explicit Stratum and Owner-Member

Owner-Member	Population Counts				Expected Respondent Sample Size			
	Residen-tial	Commercial and Industrial ≤ 1000 KVA	Commercial and Industrial > 1000 KVA	Total	Residen-tial	Commercial and Industrial ≤ 1000 KVA	Commercial and Industrial > 1000 KVA	Total
Jackson Energy	47,626	3,592	5	51,223	66	55	1	122
Salt River Electric	44,449	2,735	14	47,198	62	42	4	107
Taylor County RECC	22,666	2,930	9	25,605	31	45	2	79
Inter-County Energy	23,847	1,404	3	25,253	33	21	1	55
Shelby Energy	14,904	372	8	15,284	21	6	2	28
Farmers RECC	22,891	1,779	6	24,676	32	27	2	60
Owen Electric	55,053	2,243	24	57,320	76	34	6	117
Clark Energy	24,394	1,615	1	26,010	34	25	0	59
Nolin RECC	30,926	1,987	2	32,915	43	30	1	74
Fleming-Mason Energy	17,693	1,607	5	19,305	25	25	1	50
South Kentucky RECC	60,730	4,769	15	65,514	84	73	4	161
Licking Valley RECC	16,244	1,178	6	17,429	22	18	2	42
Cumberland Valley Electric	22,183	1,486	15	23,684	31	23	4	57
Big Sandy RECC	12,102	1,106	1	13,209	17	17	0	34
Grayson RECC	14,225	1,242	2	15,469	20	19	1	39
Blue Grass Energy	52,419	2,607	12	55,038	73	40	3	116
Total	**482,351**	**32,651**	**129**	**515,131**	**668**	**500**	**32**	**1,200**

6.3 Scenario 8: DSM Program Tracking System

If EKPC were to pursue any of the enhanced EM&V scenarios presented in this report, it will be necessary to consider development and adoption of a more sophisticated DSM Program Tracking System. Even under Business-As-Usual Scenario 6, we recommend adoption of a DSM Program Tracking System to support EM&V.

Several important recommendations about tracking systems are taken below from APPA:[14]

Evaluation requires that the data be available in an electronic format in order to calculate program impacts. There are several commercial database management software tools available that can meet the need; some of the most common are Microsoft Access, dBase, Oracle, Corel Paradox, and FoxPro.

Even though spreadsheets offer database features, true database software offers several advantages over other options like spreadsheets, the most important of which is the ability to pull information from the system in a variety of configurations. (This is the relational feature of a database.) For example, utility staff may want to access customer names, account numbers, and telephone numbers for a telephone survey; a relational database will allow staff to pull that information without having to print the entire database. Most spreadsheet programs do not offer the relational feature.

Another feature to consider when selecting a database is how well the software interacts with existing software at the utility. For example, it is easier to import and export data from and to the utility's main database with some programs than it is with others. If the utility already uses particular spreadsheet software and particular word-processing software, staff will want to consider how easy it is to bring data in and out of those programs for analysis.

Development of a DSM Program Tracking System to support EM&V can be costly if developed from scratch; however there are several commercially-available systems that make use of program implementation experience that may be readily transferrable to EKPC. The key is to develop a system that contains and tracks all of the necessary data elements for direct input to program analysis models (such as the California cost benefit tests) and that can be queried for other data collection activities, such as telephone and mail surveys. Results from these surveys would then be appended to existing records of customers participating in the programs, via their account number or other Unique Identifier code.

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[14] [14] From APPA Freeman, Lopes and Mulholland; ***Evaluating Your Utility's Energy Services Programs: Market Research and Evaluation for Energy Efficiency Professionals*** (2008).

Recommendations for a DSM Program Tracking System are provided below, based upon DNV KEMA experience developing such systems for other clients.

Program tracking is a multi-pronged approach that ideally provides redundant paper and electronic files as well as streamlined summary data in various regular reports and dashboard functions. DNV KEMA has built a program infrastructure that allows for real-time, secure, dynamic data tracking, and reporting. This high level of functionality has allowed program managers to access current program reporting data, giving them the critical information necessary to make informed decisions.

Tracking systems and dashboards utilized by other utilities include such features as:

- Relational (SQL) tracking database
- Paper filing system
- On-line real-time program dashboard
- Weekly, monthly, and annual reports
- Utility (EKPC and Owner-Member) access to data
- Specific project data (customer and project)
- Data to support EM&V activities
- Data security

The core of the tracking system is a relational SQL-based database that serves as the central clearinghouse for all information relevant to the DSM programs. The database is the entry point for applications and includes a detailed series of tracking milestones so that the project team can follow the progress of the application and record important events affecting the project's movement through the process. Since each member implements their own version of the program these data are not currently accessible to EKPC. A centralized tracking system would resolve that issue and enable EKPC to have more systematic oversight of program activities.

Effective database systems are designed for ease of use both to maintain efficiency and assure that results are consistent. Application forms are setup to simplify entry by users. Project results are calculated within the database and stored at various points in the project review cycle. Milestone tracking can identify who is responsible for the application at various steps as well as tracking critical project dates and status changes. In addition to tracking the detailed results for each project, a database may includes numerous reports and views to allow program staff to review projects in aggregate or otherwise analyze program data.

Backup date is maintained via both electronic and a hardcopy for regulatory and other reporting. This redundancy allows for the safeguarding of data, while also maintaining an ability to check for quality

control processes to make sure that program savings and incentive numbers are consistent with all data from member reporting and Program applications. The paper copy of all files also provides an audit trail for all activities within the program. At present it is unclear the amount and level of data that is maintained by the individual Owner-Members on DSM program activities, since they are not currently required to provide backup documentation to EKPC. A DSM Program Tracking System would enable DSM staff at the Owner-Members to provide scanned copies of audit reports, project job specifications, receipts for purchased energy efficiency measures, or other documentation in support of the various programs. The key is to make the process simple and limit the burden on members, while building a more robust database at the level of detail and accountability for future EM&V.

DSM Program Tracking Systems can include such features as a web-based performance dashboard that tracks energy and demand savings, incentives payments, program budget and energy credits in real-time. The dashboard is typically located on a secure website and provides the program managers with real-time access to the most important program data. The dashboard is connected to the tracking database so that results are real time. Example reports often include such features as an Energy Advisor Report, which summarizes the jobs currently in process for a specific individual Energy Advisor with schedule and status information. Other reports might be for tracking Transfer Payments, preparing the RUS reports, etc.

Key to the success of DSM Tracking System is that in order to effectively track and report on the programs, it must facilitate member's ability to easily access and understand program data. Needs expressed by the members through this study can help guide the development of an appropriate system. The member staff in all areas of the program, locally based and remote, record all communications with contacts. Eligible contacts include anyone who contacts the program or who staff members interact with in their program work, including customers, contractors, vendors, utility representatives, and trade allies. The benefits to capturing this information include:

- Staff in multiple locations have access to contact data, which simplifies disseminating information about projects
- The historical contact record helps inform staff as they communicate with customers about new issues or how previous issues have been handled with a specific customer
- Improve follow-up tracking to remind staff to follow through on discussions with customers when a follow-up is required
- Allows staff to pass a contact from one staff member to another to handle the case
- Facilitates communications and coordination with utility operations and Customer Service staff

- Responsibility for development and maintenance of the DSM Tracking System would ideally be given to a DSM EM&V manager, who would also be responsible for development of reports and communications about program progress to various stakeholders.

7. Data Requirements and Gap Analysis

The project team conducted a data gap analysis and developed recommendations. This analysis focused on types of data available, rather than quantity or quality of current data or data tracking mechanisms. Section 6 contains comments regarding recommendations for a DSM Program Tracking System. This section discusses:

- Data Requirements and Gaps
- Gap Analysis
- Recommendations

7.1 Data Requirements and Gaps

EKPC's existing process captures many data sets required for an expanded EM&V under industry standard protocols. The table below displays EKPC DSM programs, by category; current and recommended protocols; and data gaps. The following subsections discuss the data gaps and our recommendations.

Table 7-1. Current and Recommended Protocols and Data Gaps

Program Category	Representative Programs	Current practice	Recommended protocols	Data Gaps
Residential Weatherization	-Button Up Weatherization -Button Up with Air Sealing -HVAC Duct Sealing Program	Application of engineering estimates, with some industry experience – specifically regional to reflect weather factors	statistically-based billing analysis based on whole facility metering (at a minimum utility monthly meters, with interval facility metering for more rigorous scenarios).	Owner Member billing data (possible gaps to be determined)
Residential HVAC Equipment	Heat Pump Retrofit	For ex-ante (pre-retrofit) estimates, current practice is application of engineering estimates, based on industry experience and equipment specifications (equipment efficiency ratings), which are used to develop deemed savings.	statistically-based billing analysis based on whole facility metering with statistical modeling of the HVAC system (IPMVP Option A), or, assuming it can be isolated separate metering of the HVAC system (IPMVP Option B).	Owner Member billing data (possible gaps to be determined)
Residential Lighting	Residential Advanced LED Lighting	For ex-ante (pre-retrofit) estimates, current practice is application of engineering estimates, based on industry experience and equipment specifications (equipment/lighting efficiency ratings), which are used to develop deemed savings.	Either engineering algorithms based on these efficiency ratings, combined with industry experience/assumptions on mitigating factors that affect both overall (e.g. percentage of lighting equipment not applied/breakage) and coincidence factors affected by load shape parameters (e.g. when is lighting used).	-Number of bulbs distributed at Member meetings and kW -Confirmation of bulb installation
Residential New Construction	-TSE Home -TSE Manufactured Home Heat Retrofit	building energy simulation modeling, which will identify the incremental improvement attributed to a choice of more efficient measures and equipment vs. lesser efficient choices, based on total building modeling	Recommended protocols under most scenarios would include whole facility metering for TSE Home, with statistical modeling of the whole building or HVAC system (IPMVP Option D), for TSE Home Heat Retrofit or, assuming it can be isolated separate metering of the HVAC system (IPMVP Option B). This metered facility and end use analysis, included in the definition of Residential New Construction Protocol (RNC), would generate energy usage estimates that would then be compared to the ex-ante modeled levels and an applicable set of realization rates.	Whole facility metering (availability to be determined)

Table 7-1. Current and Recommended Protocols and Data Gaps (cont'd)

Program Category	Representative Programs	Current practice	Recommended protocols	Data Gaps
C&I Lighting	C&I Advanced Lighting	Application of engineering estimates, based on industry experience and equipment specifications (lighting efficiency ratings), which are used to develop savings.	Recommended protocols under most scenarios would include either engineering algorithms based on these efficiency ratings, combined with industry experience/assumptions on mitigating factors that affect both overall (e.g. percentage of lighting equipment not applied/breakage) and coincidence factors affected by load shape parameters (e.g. operating hours, business type).	(EKPC may already have): -New energy efficiency system size & efficiency -Old system size & efficiency
Residential Demand Response	-Residential $imple Saver for A/C and Water Heat Programs	End use metering under IPMVP Option B, particularly since the specific end use equipment circuits can be isolated and would be included in the definition of Residential Demand Response (RDR), which would generate load reduction estimates with measurable precision levels and override rates.	Current practice is standard protocol	None
Commercial/Industrial Demand Response	-ETS Incentive DR Program	End-use metering	End use metering is the standard protocol for EM&V. Since every unit would have the load recording capability, no sampling is required – a census sample is typical. Recommended protocols would continue to be end use metering under IPMVP Option B, particularly since the specific end use equipment circuits can be isolated., and would be included in the definition of Commercial Demand Response (CDR), which would generate load reduction estimates with measurable precision levels and rates of "failure" when unplanned peak period usage occurs.	None

7.2 Gap Analysis

The project team developed the gap analysis by comparing existing data to the required data under the recommended evaluation protocols in Section 6. To determine existing data, the project team interviewed EKPC staff and an external consultant. Where applicable, we comment on existing data availability, comprehensiveness, and access.

This subsection discusses the data gaps as identified in the subsection above and investigates possible methodologies to mitigate these current barriers to a more robust EM&V process. Data gaps fall into two major categories: Owner-Member billing data and program data collection, storage and access.

- **Owner-Member billing data**. Currently, Owner-Members send monthly billing data for load research use. This data may be sufficient for an enhanced EM&V process and any additional data requests would likely require Owner-Member consent and participation. Most Owner-Members said they would be willing to meet billing data requests. Billing data is required under recommended protocols for residential weatherization and residential HVAC equipment program categories.

- **Program data collection, storage and access**. Some data gaps may exist due to data access. Owner-Members or their representatives conduct 100% on-site inspections for residential and energy efficiency programs program participants, then transmit these data to EKPC for transfer payment. This process has resulted in robust data collection captured in EKPC's Crystal Reports, managed by EKPC's IT department (Todd Pauley). It is our understanding that Linda Perry receives a subset of these data and that other users of the DSM program data do not have access to the full database so are unaware of what level of data is actually captured or used by John Farley in calculating impacts.

- **Additional data collection (preliminary analysis)**. Since the Owner-Members already collect program data, EKPC should expand their monthly data requests to include the program details necessary for a higher level of impact evaluation.

7.3 Recommendations

- **Review adequacy of existing Owner-Member billing data supplied to EKPC's Load Research Group**. The process should be reviewed and adjusted for an enhanced EM&V effort.

This may include adjusting frequency (currently monthly), data formatting, data field, or other variables as required by the protocol. To minimize Owner-Member effort, EKPC may want to investigate an automatic billing data transfer. This may require Owner-Member consent and an investigation to determine IT system compatibility between EKPC and each Owner-Member. Through preliminary investigations and interviews, the project team has determined that Owner-Member would willingly provide access to the data if EKPC provides the rationale and appropriate education; took the lead in setting up the processes; and minimized interruption to Owner-Member business operations.

- **Develop standard data collection forms.** Because EKPC does not require standard data collection forms, Owner-Members may select and use the tool that works best for them. At a minimum, their tool must include data mandated on EKPC's Web-based online form for transfer payment. Any additional data required under recommended Protocols may be added to these standard forms and collected when Owner-Members transmit. As an example, Appendix B contains data collection forms that one Energy Advisor created for four DSM programs.

- **Implement DSM Program Tracking System**. This recommendation is discussed in detail under Scenario 8 and will ensure that data is appropriately stored and disseminated as required to conduct impact evaluation analysis, load forecasting, and other uses.

8. EM&V Budgetary and Organizational Requirements

8.1 EM&V Organization and Staffing

This section reviews EKPC's current structure for conducting EM&V as based on interviews with various staff and a review of company organization charts. We compare the current structure to other peer organizations more heavily involved in EM&V. Finally, we present recommendations for a revised organization, staffing and training program to bring the current organization in line with what would be required under the various scenarios discussed in this report.

8.1.1 Current Organization and Staffing

EKPC carries out the EM&V activities with contributions from staff in various departments. Data is collected and reported by member Energy Advisors and the program vendor. Staff members within EKPC aggregate and report the data to management, provide it to an outside contractor for calculation of impacts, which in turn are used by staff in Load Forecasting and Power Supply Planning in their modeling. There is currently no one dedicated exclusively to DSM program management for EKPC, nor for EM&V of the programs. These functions are carried out by various departmental staff across at least 3 executive reporting structures. This structure limits the development of a more sophisticated EM&V function since the staff members involved report to different managers and directors, and have other responsibilities outside of DSM program management and EM&V.

Figure 8-1 below lists the various individuals who report being practitioners or users of EM&V data, their titles and estimated percentage of time spent on these activities. According to staff estimates obtained during interviews, approximately 3.2 full-time-equivalent (FTE) staff at EKPC contributed to EM&V this past year, totaling 6,558 hours. Virtually all of the staff working on some portion of DSM EM&V (either reporting to be practitioners or users of EM&V data in their work) have other responsibilities, and only get involved in EM&V part time, or during portions of the year. Having activities spread among different individuals and departments presents opportunities for confused priorities and conflicting goals. Efficiencies in completing work can also be compromised.

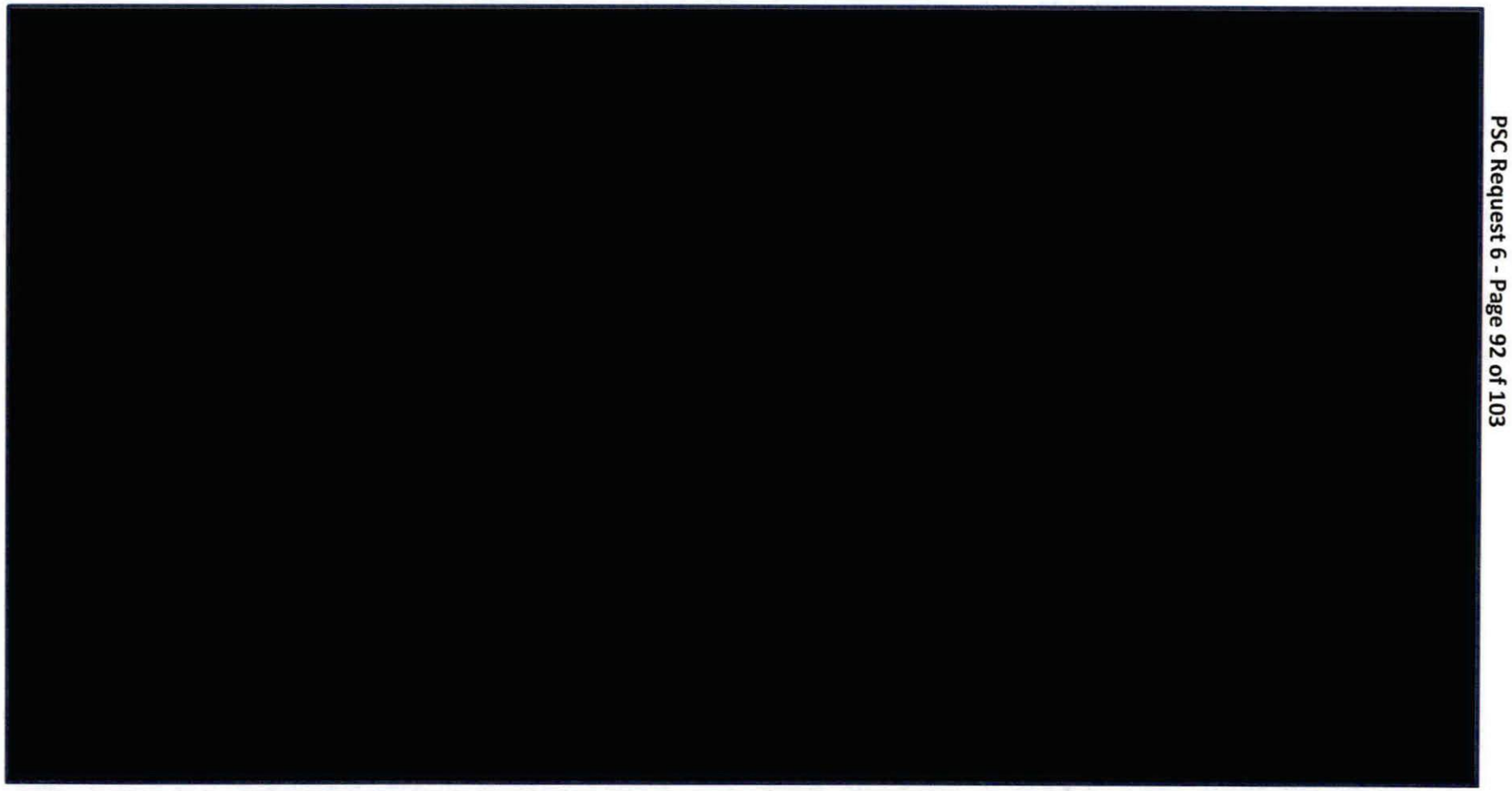
More critical, however, may be the mixed reporting responsibilities of those involved in the existing DSM data collection, management and analysis process. This can be seen in Figure 8-2, the organization chart, which shows the current structure.

Figure 8-1: EKPC Current Staff Allocation (Hours/FTEs) Spent on EM&V

EKPC Executive/Staff	FTE	Hours / Year	Title	Function	Data User or Practitioner

Figure 8-2 illustrates the current organizational structure for DSM program management and evaluation staff. A key is provided showing direct users of DSM versus practitioners or those who develop or analyze DSM data. Red arrows depict informal relationships between groups where data are transferred, but where no formal reporting relationship exists.

Figure 8-2: EKPC DSM Organizational Structure



As is evident from Figure 8-2, DSM activities are spread across the organization with no single reporting structure to one person in senior management. Other organizations with DSM portfolios typically have only two groups involved – one responsible for program implementation, and one responsible for planning and evaluation. The program implementation team usually consists of a Residential Program Manager, and a C&I Program Manager, each responsible for the programs that serve their respective sectors.

As is evident from this figure, DSM activities are spread across the organization with no single reporting structure to one person in senior management. Other organizations with DSM portfolios typically have only two groups involved – one responsible for program implementation, and one responsible for planning and evaluation. The program implementation team usually consists of a Residential Program Manager, and a C&I Program Manager, each responsible for the programs that serve their respective sectors.

8.1.2 Organization and Staffing Recommendations

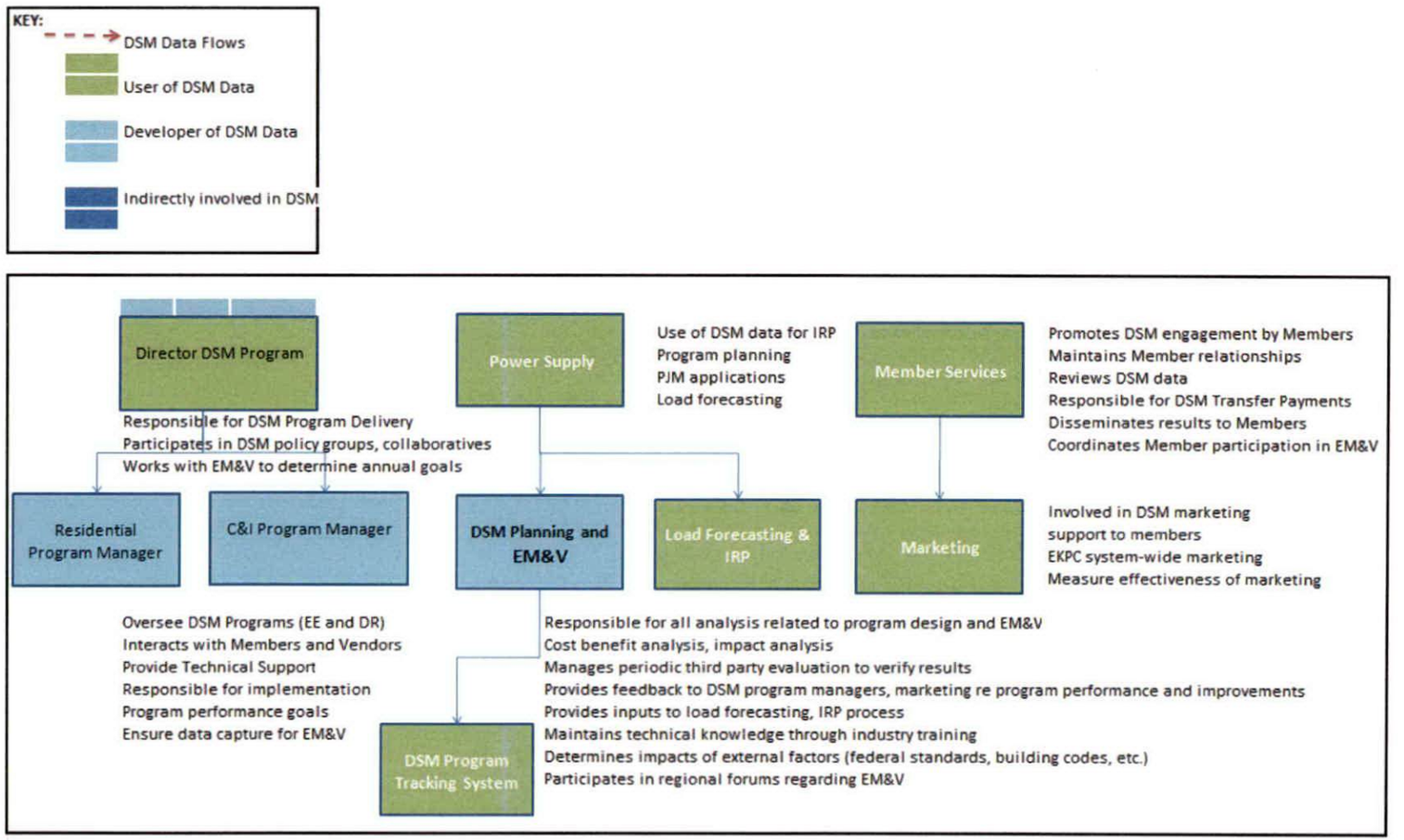
DNV KEMA presents a recommended organization for an expanded DSM function and EM&V function below. We do not presume to suggest how these groups should report up the corporate structure, but can report that most organizations split responsibilities for delivery with some relationship to customer service (in EKPC's case, Member Services and Marketing), and Power Supply Planning, where responsibility for measurement of goals lies.

As previously noted, EKPC spends about 4.2 FTEs of effort on DSM and EM&V activities, according to self reports from staff interviews. We recommend that, for an organization of the size of EKPC, at least 3 FTEs on the program delivery side, working for a Director of DSM (a fourth) would be necessary for implementing the five-year plan. For the EM&V function, we recommend one subject matter expert supported by 2 load research analysts and one "new" market research function for overseeing customer surveys and other data collection activities, for another total of 4 FTEs. The market research staff member would need to have some basic sample design capabilities, some survey design capability, have a strong understanding of utility customer information systems and billing data (ideally) and have the ability to critique and supervise outside vendors conducting surveys. Ideally they would have some qualitative research skill sets or at least be able to manage work conducted by others.

Finally, defensible EM&V is typically carried out by independent third parties, as has been the case in EKPC's use of an outside consultant. This is most likely the best course for EKPC, however with enhanced internal capabilities for performing benefit-cost analysis and other basic program design modeling. A new EM&V department should have the ability to draft RFPs, critique the work of EM&V

consultants, and understand how EM&V results are used in Power Supply Planning. EKPC has strong internal resources that could carry out most of these functions (save the market research/statistics function) with some targeted industry training.

Figure 8-2: Recommended EKPC DSM & EM&V Organizational Structure



8.2 EM&V Budgetary Requirements

EKPC's current evaluation process represents a strong minimally acceptable approach to evaluation of DSM programs, consistent with industry practice for entities of comparable size. The EM&V Protocols presented in this report involve increasingly complex approaches to evaluation that would be required to meet the demands of the scenarios outlined by EKPC. These approaches in turn require enhanced resources in the way of staffing, technical capability and cost for data collection and outside consulting expertise.

Table 8-1 below outlines general guidelines for evaluation expense, accordingly to a guidebook published by the American Public Power Association.

Table 8-1: Comparative Costs of EM&V[15]

Impact Evaluation – Very complex, Triangulation approach[16]	Includes surveys and engineering estimates, potentially for a number of measures and for a large customer sample; may also include a database assessment. For mature C&I program, would include site visits and spot metering	High cost – Site metering involves instrumentation and before after measurement; billing analysis requires significant data processing costs, but is very reliable
Impact Evaluation – Medium complexity	Would include activities listed above except for site visits and spot metering	Medium - A significant step down from the approach above, but significant analytical time
Impact evaluation –Medium to low complexity	Includes a smaller sample than for the high level impact evaluation, no onsites or metering	Medium to Low – Sampling techniques can reduce cost if the population being measures makes sense for this approach
Impact evaluation – Low complexity (EKPC current approach)	May include a qualitative, but not statistically significant survey to complement the engineering estimates, no on-site verifications or metering	Lower cost – Relies on participant counts applied to standard estimates of savings; little data collection involved.

Source: APPA

Several organizations in the EM&V industry conduct annual surveys of expenditures as a percentage of total DSM budgets. The ranges quoted in documents from ACEEE and other groups cited in Appendix A, start at a low of 1% to a high of 11%. With the most often-quoted values being 3 to 6% for investor owned utilities. Many regulatory agencies specify DSM budgets as being set at a portion of revenues, but few direct how much of the total budget should be spent on EM&V.

[15] Freeman, Lopes and Mulholland; *Evaluating Your Utility's Energy Services Programs: Market Research and Evaluation for Energy Efficiency Professionals* (2008).

[16] Triangulation refers the application of three analysis methods with the results compared to arrive at single outcome.

Taking EKPC's projected budgets for 2013 – 2017 from the 5-Year Plan, DNV KEMA has calculated ranges of EM&V budgets shown in Table 8-2 below.

Table 8-2: EM&V Budget Ranges for EE and DR

	EE and DR Budgets and Potential EM&V Budgets			Proposed EM&V Budgets		
	EE Budget	DR Budget	Total EEDR $	@ 3%	@ 5%	@ 8%
2013	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2014	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2015	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2016	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
2017	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Chapter 5 outlines an overview of the scenarios for compliance with projected PSC and PJM requirements under five different scenarios. DNV KEMA's recommended EM&V Protocols, if implemented, would require budgets in the 5-8% range for support of PSC requirements (scenarios 1 and 2). The incremental cost of compliance with PJM requirements for inclusion of only the $impleSaver Program (air conditioner and water heater demand response), identified as scenario 3, should be relatively minor, since EKPC's third party vendor already collects much of the field data required and could work with EKPC (and its PJM support consultant, if applicable) to provide the required analysis and reporting. PJM incentives could offset those additional costs. Should EKPC opt to submit additional Direct Load Control programs (ETS and, when implemented, pool pump control), identified as scenario 4, these should also be a modest incremental cost, with metering costs already identified in the recommended PSC compliance scenarios. PJM incentives could offset some/all of the incremental costs. The more significant incremental cost would be for submittal of the remaining programs, primarily energy efficiency, into the PJM capacity auction (identified as scenario 5), since the type of monitoring and precision (and associated sample sizes) would not have been necessary under PSC compliance scenarios.

A. Appendix A: Bibliography of EM&V Resources

A.1 U.S. EM&V Resources

Evaluation, Monitoring and Verification Resources	
National Action Plan for Energy Efficiency, U.S. EPA & DOE	Model Energy Efficiency Program Impact Evaluation Guide, 2007 http://www.epa.gov/cleanenergy/documents/evaluation_guide.pdf Guide to Resource Planning with Energy Efficiency, 2007 http://www.epa.gov/cleanenergy/documents/resource_planning.pdf Guide for Conducting Energy Efficiency Potential Studies, 2007 http://www.epa.gov/cleanenergy/documents/potential_guide.pdf
Efficiency Valuation Organization (EVO)	International Performance Monitoring and Verification Protocols, 2007 http://www.evo-world.org/
ASHRAE	Proposed Guideline 14P for Measurement of Energy and Demand Savings: How to Determine What was Really Saved by the Retrofit. http://repository.tamu.edu/bitstream/handle/1969.1/5182/ESL-IC-01-0704.pdf?sequence=1 ASHRAE Scoping Studies http://www.ashrae.org/technology/page/678
U.S. Department of Energy	Key Measurement and Verification documents http://ateam.lbl.gov/mv/ Final Report on the Clean Energy/Air Quality Integration Initiative Pilot Project of the U.S. Department of Energy's Mid-Atlantic Regional Office http://apps1.eere.energy.gov/wip/clean_energy_initiative.cfm EERE Impact Evaluation Resource Documents http://www1.eere.energy.gov/ba/pba/program_evaluation/evaluation_doc uments.html
California Public Utilities Commission	The California Evaluation Framework http://www.cee1.org/eval/CEF.pdf California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects http://www.energy.ca.gov/greenbuilding/documents/background/07J_CPUC_STANDARD_PRACTICE_MANUAL.PDF California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals http://www.cpuc.ca.gov/PUC/energy/electric/Energy+Efficiency

ISO New England	ISO New England Manual for Measurement and Verification of Demand Reduction Value from Demand Resources http://www.neep.org/about/final_MV_manual.pdf

A.2 International EM&V Resources

International Energy Agency	Evaluating Energy Efficiency Policy Measures & DSM Programmes.(2006) http://dsm.iea.org
World Bank Carbon Finance Unit	Achieving Greenhouse Gas Emission Reductions in Developing Countries through Energy Efficient Lighting Project in the Clean Development Mechanism, November 2006 http://carbonfinance.org/Router.cfm?CatalogID=30255&Page=DocLib

B. Appendix B: Data Collection Form Examples

This Appendix contains an Excel based data collection developed and used by an Energy Advisor (EA). Because EKPC does not require standard data collection forms, each EA may select or develop their own that meets their needs and collects data sufficient to request transfer (rebate) payments.

Appendix Table B-1: Button Up program data collection form example

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2					BUTTON UP										
3															
4	SERVICE/ LOCATION #						HOUSE DATA:								
5	COOPERATIVE:														
6	METER #:						CONSTRUCTION QUALITY:				(BEST, AVERAGE, OR GOOD)				
7	NAME:														
8	ADDRESS:						PRIMARY HEAT SOURCE:								
9	CITY:														
10	ST:						AIR CONDITIONING SYSTEM:				(CENTRAL, WINDOW, OR NONE)				
11	ZIP:														
12	SQUARE FEET:						PRIMARY DUCT LOCATION:								
13	AGE:														
14	HOUSE TYPE:						SECONDARY DUCT LOCATION:								
15	FOUNDATION TYPE:														
16	INSULATION VALUES:						DUCTS INSULATED?								
17	FLOOR														
18	WALL						BTUH REDUCTION								
19	CEILING														
20	FINAL VALUES:							CEILING:					DOOR:		
21	FLOOR														
22	WALL							FLOOR:					NET WALL:		
23	CEILING														
24								WINDOW:					TOTAL BTUH		
25															
26															
27							INSPECTION DATE:								
28															
29							LABOR/ADMINISTRATIVE HOURS:			1					
30															

Appendix Table B-2: Partial screen shot – Touchstone Energy Home data collection form example

1					
2			TOUCHSTONE ENERGY HOME		
3					
4	SERVICE/ LOCATION #				
5	COOPERATIVE:				
6	METER #:				
7	NAME:				
8	ADDRESS:				
9	CITY:				
10	ST:				
11	ZIP:				
12	SQUARE FEET:				
13	AGE:				
14	HOUSE TYPE:		*(SINGLE STORY, TWO STORY, SPLIT FOYER, STORY & 1/2, MANU*		
15	FOUNDATION TYPE:				
16	INSULATION VALUES:				
17	FLOOR				
18	WALL				
19	CEILING				
20	UNIT #1:				
21	HEATINGY SYTEM TYPE:				
22	MANUFACTURER:				
23	SIZE:		TONS		
24	INDOOR MODEL #:			OUTDOOR MODEL #:	
25					
26	INDOOR SERIAL #:			OUTDOOR SERIAL #:	
27					
28	AUXILIARY HEAT:		kW		
29	FANS RATED CAPACITY				
30	INITIAL DUCT LEAKAGE:				
31	FINAL DUCT LEAKAGE:				
32	AGE OF DUCT SYSTEM:				
33	DUCT LOCATION:				
34					
35	UNIT #2:				

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL INFORMATION REQUEST RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 7
RESPONSIBLE PERSON: **Julia J. Tucker**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 7. Refer to EKPC's response to Staff's First Request, Item 10.a., and page 15 of 19 of the same response, which is the "Years For Normal Weather" page of the Itron report on EKPC's 2013 Weather Normalization Survey.

Request 7a. EKPC's response to Item 10.a. indicates that EKPC's analysis of 15, 20 , and 30 years of weather history for the period ending March of 2014 reflects little difference in the number of Heating Degree Days or Cooling Degree Days in the three periods of time. Given that it has historically used 30 years to determine normal weather, explain why EKPC specifically chose 15 years and 20 years as the other time periods to include in its analysis.

Response 7a. EKPC used the ITRON report as a guide for analyzing data based on 5 year increments. In addition to the data previously provided, additional analyses were performed on 5, 10, and 25 year periods. As the time period shortened to 5 years,

the degree days increased. EKPC chose the 30 year period as it represented a more conservative assumption.

Request 7b. The chart on page 15 indicates that the percentage of respondents using 30 years as the period of time to determine normal weather declined from 43 in Itron's 2006 survey to 33 in its 2013 survey. The chart also reflects that the percentage of respondents using ten years to determine normal weather increased from 16 in 2006 to 28 in 2013, making ten years the second-most-frequent period of time used, after 30 years (33 percent vs. 28 percent), to determine normal weather. Explain why EKPC did not include ten years in its analysis of different time periods discussed in its response to 10.a.

Response 7b. The response provided to Request 10a was not inclusive of all analyses completed, however, it illustrated that EKPC continued to be conservative with its normal weather assumption. The tables, on page 3 of this response, show each of the periods evaluated. The 5 year period shows increases in both heating and cooling degree days. Given this, using this shorter time period would result in higher energy and peak demand forecasts.

All Months	CDD	HDD	Total
30 Years	1215	4585	5800
25 Years	1207	4583	5790
20 Years	1218	4575	5793
15 Years	1250	4544	5794
10 Years	1280	4518	5798
5 Years	1302	4592	5894

Sep. Seas.	CDD May – Sept	HDD Nov-Mar	Total
30 Years	1165	3837	5002
25 Years	1223	3834	5057
20 Years	1167	3843	5010
15 Years	1194	3844	5038
10 Years	1223	3825	5048
5 Years	1253	3896	5149

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL INFORMATION REQUEST RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 8
RESPONSIBLE PERSON: **Scott Drake**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 8. Refer to EKPC's response to Staff's First Request, Item 11, which states, "It is difficult to state the exact amount of DSM program costs currently in EKPC's base rates because the last base rate case, Case No. 2010-00167, was the result of a black box settlement. The rate case utilized a forecasted test year which was the 12 months ending December 31, 2011." Refer also to the Commission's January 14, 2011 Order in Case No. 2010-00167,[1] pages 21-22, which states, "We note that, in this case, EKPC projected a level of transfer payments under its DSM programs of $1.5 million for its forecasted test year." Explain whether EKPC considers $1.5 million to be the DSM amount included in its base rates.

Response 8. While EKPC considers the $1,500,000 in DSM program transfer payments to be included in its base rates, these transfer payments do not constitute the

[1] Case No. 2010-00167, *Application of East Kentucky Power Cooperative, Inc. for General Adjustment of Electric Rates* (Ky. PSC Jan. 14, 2011.).

only component of DSM program cost. As EKPC stated in its response to Request 11 of the Staff's First Request, the total cost of DSM programs included in the 2011 forecasted test year was $6,095,551. This dollar amount was provided in EKPC's response to Item 56(d) of the Commission Staff's First Data Request dated May 14, 2010 in Case No. 2010-00167. In its January 14, 2011 Order in Case No. 2010-00167, the Commission determined that EKPC could have justified an increase in revenues of $43,846,946, but found the black box settlement increase in revenues of $43,000,000 to be reasonable. As the amount of increase found reasonable represents 98.07 percent of the increase that could have been justified ($43,000,000 / $43,846,946), it could be estimated that EKPC's base rates include $5,977,907 in DSM program costs.

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL INFORMATION REQUEST RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 9
RESPONSIBLE PERSON: **Scott Drake**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 9. Refer to EKPC's response to Staff's First Request, Item 11. EKPC's response to Item 11.a. references the amount of DSM program costs in EKPC's base rates. Describe in general what impacts the August 20, 2015 Base Residual Auction results in PJM Interconnection, LLC's new Capacity Performance construct are expected to have on EKPC's DSM/EE cost/benefit analyses and future efforts for energy efficiency.

Response 9. The results of the August 20, 2015 Base Residual Auction in PJM's Capacity Performance Construct are not expected to have any impact on EKPC's DSM/EE cost/benefit analyses or future efforts for energy efficiency. EKPC does not use the PJM auction prices to determine the avoided capacity costs for cost/benefit analyses. The avoided capacity costs are instead based on the carrying costs of the next planned generating unit(s).

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL INFORMATION REQUEST RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 10
RESPONSIBLE PERSON: **Scott Drake**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 10. Refer to EKPC's response to Staff's First Request, Item 11b., page 15 of 28. Explain the drop in the number of SimpleSaver switches installed from 2013 to 2014.

Response 10. In 2012, EKPC, on behalf of the 16 Member Systems developed a calling campaign to promote $impleSaver program participation. The calling campaign provided an opportunity to explain individually how the $impleSaver program works and how the end-use member benefits from participating. The calling campaign was highly successful in the beginning and accounts for nearly 50% of all new switch installations since 2013. We have seen a steady decline in the success of the calling campaign due to already reaching the retail members that are most likely to participate. EKPC and the 16 Member Cooperatives continue to utilize multiple communication mediums to promote the program.

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL INFORMATION REQUEST RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 11
RESPONSIBLE PERSON: **Scott Drake**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 11. Refer to EKPC's response to Staff's First Request, the table shown in Item 12, and to Item 24. The table in EKPC's response to Item 12 shows the projected 1 percent goal of annual retail savings from 2015-2020. EKPC's response to Item 24 states that "EKPC's customer base is more heavily residential, more rural, poorer, has a much higher share of households headed by a person over the age of 65, and the housing stock has a much greater share of manufactured and mobile homes than the state as a whole."

Request 11a. Identify the customer class, or classes, from which EKPC expects to achieve the 1 percent of annual retail savings goal by 2020 and explain how it intends to achieve that goal.

Response 11a. The 16 Member Cooperatives offer DSM programs to its retail classes: residential, commercial, and industrial classes. In this 2015 IRP, EKPC has

identified a portfolio of existing and new DSM programs as well as the participation levels needed in those programs in order to achieve the 1% savings goal in each class. EKPC will work together with its 16 Member Cooperatives to enhance existing programs and implement new programs in order to achieve the participation levels and savings goals. Program designs, marketing campaigns, customer recruitment, program delivery approaches, quality control, and EM&V plans will each be fine-tuned to maximize participation, energy savings, and cost-effectiveness.

Request 11b. Explain whether EKPC plans any formal discussions on this goal with its Member Cooperatives' residential, commercial, and industrial customers.

Response 11b. EKPC and the 16 Member Cooperatives plan to utilize the Collaborative for formal discussions with stakeholders. The end-use members are predominately residential and that class is well represented within the Collaborative. When it established Collaborative 2.0, EKPC invited the Commission, the Attorney General, the Kentucky Environmental Foundation, the Mountain Association for Community Economic Development, Kentuckians for the Commonwealth, the Federation of Appalachian Housing Enterprises, the Cumberland Chapter of the Sierra Club, and stakeholders representing other classes including: Nucor/Gallatin, Kentucky Industrial Utility Customers, and the Kentucky Association of Manufacturers.

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL INFORMATION REQUEST RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 12
RESPONSIBLE PERSON: **Julia J. Tucker**
COMPANY: **East Kentucky Power Cooperative, Inc.**

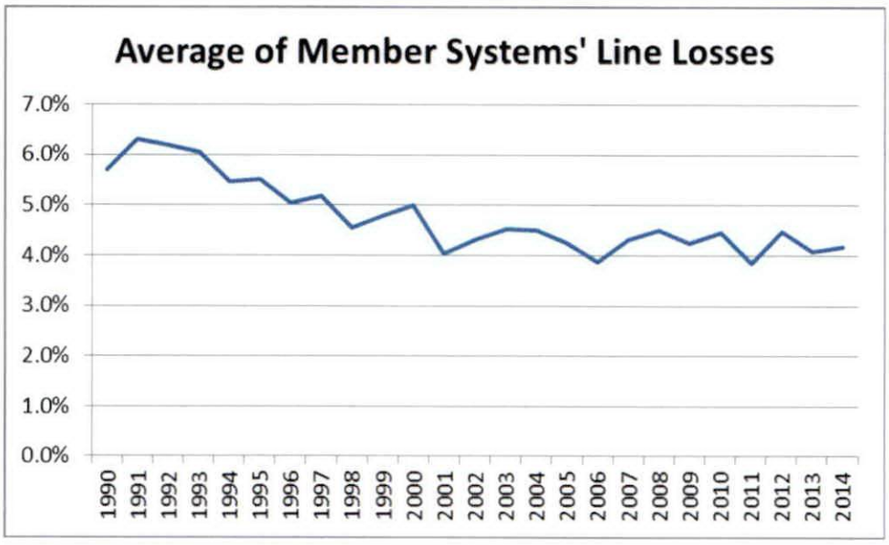
Request 12. Refer to EKPC's response to Staff's First Request, Item 17, which states, "EKPC observed the lower-than-expected transmission loss values for 2012 and 2013. However, EKPC was unable to substantiate why those values would have decreased on a permanent basis. There were no structural improvements documented to support a permanent reduction in transmission losses."

Request 12a. Explain whether EKPC has reviewed all of its interconnection points for the accurate flow of energy.

Response 12a. Yes. These are reviewed on a daily basis.

Request 12b. Explain whether EKPC is aware of any of its Member Cooperatives' having experienced higher-than-normal line losses.

Response 12b. Looking at each Member Cooperatives' historical line losses individually, no Member Cooperatives have been experiencing higher than normal losses. As shown in the graph below, the average of the Member Cooperative losses has not shown a significant change in percent loss during the time period the EKPC transmission loss declines.



Request 12c. Since the recent loss results appear significant, explain whether there has been any further analysis of the situation for an explanation and, if so, provide the results of the analysis.

Response 12c. Yes. EKPC did continue to review potential reasons for the loss reductions and has concluded the following:

- Three interconnections were added in the late 2011-early 2012 time period, including two with Duke Energy in northern Kentucky.
- A new 69 kV interconnection with AEP was established in Morgan County. Power flows on these interconnections are generally into the EKPC transmission system. Therefore, these interconnections have provided sources that are in the vicinity of these EKPC load centers rather than transmitting the necessary power longer distances across the EKPC transmission system. In addition to providing enhanced voltage support for the EKPC system in these areas, these interconnections have provided the additional benefit of reducing losses on the EKPC transmission system.
- EKPC's Cooper and Dale Stations' generation dispatch has changed significantly due to joining PJM. These generating stations are located centrally within EKPC load centers in southern and central Kentucky, respectively. Therefore, they provide local sources for the customer demand in those areas when they are dispatched. This reduces the need to transmit power across the EKPC transmission system from longer distances (e.g., EKPC's Spurlock Station or EKPC's interfaces with PJM) to these load centers. Subsequent to joining PJM, the Cooper and Dale units' output has decreased substantially, requiring EKPC to serve these areas from its Spurlock units and/or with market purchases. This increases flows across EKPC transmission facilities from the north into these areas, with a corresponding increase in transmission losses.

EAST KENTUCKY POWER COOPERATIVE, INC.
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COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 13
RESPONSIBLE PERSON: **Julia J. Tucker**
COMPANY: **East Kentucky Power Cooperative, Inc.**

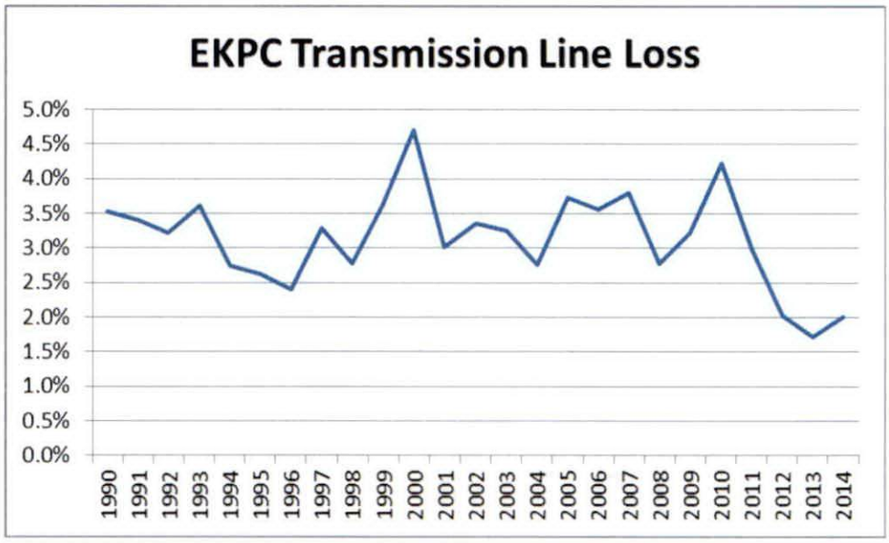
Request 13. Refer to EKPC's response to Staff's First Request, Item 17, and EKPC's IRP, Table 3-5 on pages 41-42. EKPC's response to Item 17 refers to "lower-than expected transmission loss values for 2012 and 2013." It also states that "EKPC used its historical assumption in developing the load forecast going forward." The request referred to (a) average losses for the 11 years, 2003-2013, included in the table and (b) average losses for the last six years, 2008-2013, in the table.

Request 13a. Clarify the period of time and specific years EKPC relied upon for its "historical assumption."

Response 13a. EKPC used data from 1990 to 2013 for development of the forecast assumption.

Request 13b. If the period of time relied upon by EKPC is the 11 years in the table, explain why the forecasted losses are 3.3 percent or greater when the average for those 11 years is 3.05 percent.

Response 13b. Data for 1990 to current was used.



Request 13c. If the period of time relied upon by EKPC is something other than the 11 years in the table, explain why the alternative period of time was chosen.

Response 13c. The tables provided were not all inclusive of the data considered. Given the year to year fluctuations and the long term history, the previous assumption of 3.3% was maintained. EKPC will continue to monitor and consider lowering the assumption in the next load forecast.

EAST KENTUCKY POWER COOPERATIVE, INC.
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COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 14
RESPONSIBLE PERSON: **Julia J. Tucker**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 14. Refer to EKPC's response to Staff's First Request, Item 25. Historically, some heat pump systems required a supplemental heating system when temperatures were below 30 degrees, approximately. Explain whether the use of space heaters for additional heating generally occurs in conjunction with heat pump systems.

Response 14. When temperatures reach below 30 degrees, the auxiliary heat component of a heat pump typically will run. The auxiliary heat has demand similar to strip heat. Space heaters if used as supplemental heat may be used as well if the homeowner chooses. If space heaters are the primary heating system, those will likely be running at temperatures above 30 as well.

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL INFORMATION REQUEST RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 15
RESPONSIBLE PERSON: **Jeffrey M. Brandt**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 15. Identify all net metering facilities in the service territories of EKPC's member cooperatives, the location of each facility (by county), the applicable member cooperative serving the owner of that facility, the type of facility, the amount of power (kilowatt capacity) the facility is capable of generating, and the amount of energy the facility contributed in 2014.

Response 15. The net metering customers referred to in this request are the individual Member Cooperative retail customers and EKPC does not have access to detailed account information. The amount of energy these facilities contributed in 2014 is not available due to the inherent nature of net metering. Most of these facilities are used to offset residential or commercial load and the amount of load offset is not a metered amount.

However, EKPC from time to time requests net metering information from its sixteen Member Cooperatives so that a running count of participants and a total capacity value of net metering can be determined for resource planning purposes.

The following tables represent data collected from the Member Cooperatives. Table 1 on pages 3 through 8 of this response lists individual net metering facilities by Cooperative and Table 2 on pages 9 and 10 of this response lists the same data by county.

The running total for all net metering capacity is 1,175 kW including 1,154 kW solar photovoltaic and 21 kW small wind.

TABLE 1 Facilities by Cooperative

Coop	County	PV (kW)	Wind (kW)
Blue Grass Energy	Fayette	1.98	
Blue Grass Energy	Madison	4.20	
Blue Grass Energy	Madison	4.20	
Blue Grass Energy	Harrison	2.50	
Blue Grass Energy	Madison	3.50	
Blue Grass Energy	Bourbon		1.00
Blue Grass Energy	Bourbon	0.40	
Blue Grass Energy	Fayette	5.25	
Blue Grass Energy	Bourbon	2.30	
Blue Grass Energy	Bourbon		3.50
Blue Grass Energy	Madison	4.00	
Blue Grass Energy	Scott	0.70	
Blue Grass Energy	Fayette	0.70	
Blue Grass Energy	Mercer	8.96	
Blue Grass Energy	Mercer		10.00
Blue Grass Energy	Fayette	0.70	
Blue Grass Energy	Anderson	2.80	
Blue Grass Energy	Shelby	1.40	
Blue Grass Energy	Harrison	9.99	
Blue Grass Energy	Anderson	1.05	
Blue Grass Energy	Anderson	1.05	
Blue Grass Energy	Franklin	5.50	
Blue Grass Energy	Scott	2.20	
Blue Grass Energy	Mercer	1.85	
Blue Grass Energy	Fayette	1.60	
Blue Grass Energy	Fayette	1.50	
Blue Grass Energy	Jessamine	12.74	
Blue Grass Energy	Jessamine	7.60	
Blue Grass Energy	Mercer	0.23	
Blue Grass Energy	Jessamine	28.77	
Blue Grass Energy	Franklin	6.00	
Sub Total		123.67	14.50
Inter-County Energy	Boyle	1.80	
Inter-County Energy	Mercer	55.65	
Inter-County Energy	Casey	12.88	
Inter-County Energy	Boyle	9.54	

Coop	County	PV (kW)	Wind (kW)
Inter-County Energy	Lincoln	11.28	
Inter-County Energy	Mercer	12.96	
Inter-County Energy	Boyle	5.88	
Sub Total		109.99	0.00
Farmers RECC	Hart	3.00	
Farmers RECC	Hart	5.00	
Farmers RECC	Barren	5.00	
Farmers RECC	Hart	10.00	
Farmers RECC	Hart	5.60	
Farmers RECC	Hart	9.86	
Farmers RECC	Barren	3.71	
Farmers RECC	Hart	7.20	
Farmers RECC	Hart	6.00	
Farmers RECC	Hart	5.64	
Farmers RECC	Hart	6.00	
Sub Total		67.01	0.00
Taylor County RECC	Adair	2.80	
Taylor County RECC	Adair		0.30
Taylor County RECC	Adair	4.30	
Sub Total		7.10	0.30
Salt River Electric	Bullitt	1.08	
Salt River Electric	Bullitt	1.05	
Salt River Electric	Washington	3.55	
Salt River Electric	Nelson	1.05	
Salt River Electric	Nelson	1.05	
Salt River Electric	Nelson	1.05	
Salt River Electric	Bullitt	1.05	
Salt River Electric	Bullitt	1.05	
Salt River Electric	Bullitt	1.05	
Salt River Electric	Bullitt	1.05	
Salt River Electric	Nelson	1.05	
Salt River Electric	Bullitt	1.05	
Salt River Electric	Nelson	1.05	
Salt River Electric	Nelson	1.05	
Salt River Electric	Nelson	1.05	
Salt River Electric	Spencer	6.45	

Coop	County	PV (kW)	Wind (kW)
Salt River Electric	Nelson	1.28	
Salt River Electric	Bullitt	1.28	
Salt River Electric	Bullitt	1.05	
Salt River Electric	Nelson	1.13	
Salt River Electric	Washington	5.52	
Salt River Electric	Washington	1.08	
Salt River Electric	Washington	1.08	
Salt River Electric	Washington	2.34	
Salt River Electric	Bullitt	6.00	
Salt River Electric	Nelson	3.66	
Salt River Electric	Nelson	3.92	
Salt River Electric	Washington	2.39	
Salt River Electric	Bullitt	11.00	
Salt River Electric	Bullitt	1.28	
Salt River Electric	Nelson	12.60	
Sub Total		80.30	0.00
Clark Energy	Clark	3.00	
Clark Energy	Clark	10.00	
Clark Energy	Estill	1.00	
Clark Energy	Menifee	1.00	
Clark Energy	Madison	14.00	
Sub Total		29.00	0.00
Fleming-Mason Energy	Lewis	0.60	
Fleming-Mason Energy	Fleming		3.70
Fleming-Mason Energy	Lewis	2.52	
Fleming-Mason Energy	Lewis	2.52	
Fleming-Mason Energy	Lewis	1.80	
Fleming-Mason Energy	Lewis	1.80	
Fleming-Mason Energy	Lewis	1.80	
Fleming-Mason Energy	Lewis	1.96	
Fleming-Mason Energy	Rowan	7.65	
Fleming-Mason Energy	Lewis	7.83	
Fleming-Mason Energy	Lewis	1.96	
Fleming-Mason Energy	Lewis	1.96	
Fleming-Mason Energy	Lewis	1.80	
Fleming-Mason Energy	Rowan	4.94	

Coop	County	PV (kW)	Wind (kW)
Fleming-Mason Energy	Fleming	1.80	
Sub Total		40.94	3.70
Owen Electric	Boone	3.50	
Owen Electric	Boone	9.00	
Owen Electric	Boone	8.00	
Owen Electric	Boone	200.00	
Owen Electric	Campbell	2.00	
Owen Electric	Gallatin	2.00	
Owen Electric	Gallatin		1.50
Owen Electric	Grant	2.20	
Owen Electric	Grant	10.00	
Owen Electric	Owen	12.00	
Sub Total		248.70	1.50
Shelby Energy	Henry	4.80	
Shelby Energy	Henry	1.05	
Shelby Energy	Henry	3.76	
Shelby Energy	Shelby	1.75	
Shelby Energy	Shelby	1.05	
Shelby Energy	Henry	9.84	
Shelby Energy	Henry	3.29	
Shelby Energy	Shelby	15.18	
Shelby Energy	Shelby	1.35	
Shelby Energy	Shelby	1.05	
Shelby Energy	Henry	6.10	
Shelby Energy	Trimble	16.17	
Shelby Energy	Shelby	4.51	
Shelby Energy	Henry	11.66	
Shelby Energy	Henry	19.14	
Sub Total		100.68	0.00
Nolin RECC	Hardin	4.20	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	

Coop	County	PV (kW)	Wind (kW)
Nolin RECC	Hardin	1.40	
Nolin RECC	Hardin	0.70	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	6.65	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	1.05	
Nolin RECC	Hardin	72.25	
Sub Total		98.85	0.00
Jackson Energy	Jackson	2.66	
Jackson Energy	Owsley	1.88	
Jackson Energy	Clay	7.05	
Jackson Energy	Laurel	2.65	
Jackson Energy	Rockcastle	12.96	
Jackson Energy	Lee	6.66	
Sub Total		33.86	0.00
Cumberland Valley Electric	Knox	30.00	
Cumberland Valley Electric	Knox	30.00	
Cumberland Valley Electric	Knox	30.00	
Cumberland Valley Electric	Knox	30.00	
Cumberland Valley Electric	Knox	30.00	
Sub Total		150.00	0.00
Grayson RECC	Carter	5.35	
Grayson RECC	Carter	5.00	
Grayson RECC	Rowan	1.50	
Sub Total		11.85	0.00
South Kentucky RECC	Wayne	2.00	
South Kentucky RECC	Pulaski	23.00	
South Kentucky RECC	Wayne	3.00	

Coop	County	PV (kW)	Wind (kW)
South Kentucky RECC	Pulaski	2.00	
South Kentucky RECC	Wayne	2.00	
South Kentucky RECC	Pulaski	10.00	
South Kentucky RECC	Pulaski	2.00	
South Kentucky RECC	Wayne	2.00	
South Kentucky RECC	Pulaski		1.00
Sub Total		46.00	1.00
Licking Valley RECC	Wolfe	5.50	
Licking Valley RECC	Menifee	0.25	
Sub Total		5.75	0.00
Big Sandy RECC		0.00	
Sub Total		0.00	0.00
EKPC System Total		**1,154**	**21**

TABLE 2 Facilities by County

County	PV (kW)	Wind (kW)
Adair	7.10	0.30
Anderson	4.90	
Barren	8.71	
Boone	220.50	
Bourbon	2.70	4.50
Boyle	17.22	
Bullitt	27.98	
Campbell	2.00	
Carter	10.35	
Casey	12.88	
Clark	13.00	
Clay	7.05	
Estill	1.00	
Fayette	11.73	
Fleming	1.80	3.70
Franklin	11.50	
Gallatin	2.00	1.50
Grant	12.20	
Hardin	98.85	
Harrison	12.49	
Hart	58.30	
Henry	59.63	
Jackson	2.66	
Jessamine	49.11	
Knox	150.00	
Laurel	2.65	
Lee	6.66	
Lewis	26.55	
Lincoln	11.28	
Madison	29.90	
Menifee	1.25	
Mercer	79.65	10.00
Nelson	29.93	
Owen	12.00	
Owsley	1.88	
Pulaski	37.00	1.00
Rockcastle	12.96	

County	PV (kW)	Wind (kW)	
Rowan	14.09		
Scott	2.90		
Shelby	26.29		
Spencer	6.45		
Trimble	16.17		
Washington	15.95		
Wayne	9.00		
Wolfe	5.50		
Total	**1,154**	**21**	**1,175**

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL INFORMATION REQUEST RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 16
RESPONSIBLE PERSON: **Julia J. Tucker**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 16. Refer to EKPC's response to Staff's First Request, Item 40, which explains that the "Best 1" plan is EKPC's optimal resource plan, based on the ranking of system profit and risk parameters in the RTSim model. The data on page 2 of EKPC's response show the "Best 1" plan with the greatest system profit and lowest risk factor among the five plans modeled. Clarify whether the 'Try" numbers on page 2 reflect the number of iterations or something else related to the ranking of the plans.

Response 16. Yes, "Try" numbers represent the iteration number of the plan.

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COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 17
RESPONSIBLE PERSON: **Julia J. Tucker**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 17. Refer to EKPC's IRP, Section 3.4.1.3 on page 63, and its responses to Staff's First Request, Items 42 and 43. EKPC states that it and its member systems maintain regular contact with large industrial and commercial customers.

Request 17a. Explain who initiates these contacts and whether there is a staff position with responsibility for such contacts.

Response 17a. The process and staff responsibilities vary among Member Cooperatives. All Member Cooperatives have staff responsible for customer relations.

Request 17b. Explain whether a typical method is used and a regular time interval utilized in making such contacts.

Response 17b. Method and time intervals are determined, as appropriate, by each Member Cooperative.

EAST KENTUCKY POWER COOPERATIVE, INC.
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COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 18
RESPONSIBLE PERSONS: **Julia J. Tucker**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 18. Refer to EKPC's 2014 Load Forecast, Table 4.1.1 and the related text on page 26, and its response to Staff's First Request, Item 46, which includes an update of the table.

Request 18a. Clarify whether the County Total Household numbers in the original table have an impact on the 2014 Load Forecast or are provided solely for comparison to the numbers shown as the Member-System Portion of the total households.

Response 18a. The numbers in the original graph did not impact the forecast. The graph reported the incorrect series in the Load Forecast report. The correct series was used in modeling the forecast.

Request 18b. Provide a revision of the sentence following Table 4.1.1 which includes the new beginning and ending County Total Household numbers reflected in the updated table.

Response 18b. The correct sentence should be:

The forecast indicates that, through 2034, total households will increase from 1,188,229 to 1,414,682, an average of 0.8 percent per year, while the Member Cooperative portion will increase from 637,628 to 768,416, an average of 0.9 percent per year.

EAST KENTUCKY POWER COOPERATIVE, INC.
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COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 19
RESPONSIBLE PERSON: **Julia J. Tucker**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 19. Refer to EKPC's response to Staff's First Request, Item 47, and its 2014 Load Forecast, Exhibit LF-1. Confirm that the study in Exhibit LF-1 is the same study included in EKPC's March 31, 2015 post-case filing in Administrative Case No. 387.[2]

Request 19. Yes, it is the same study.

[2] Administrative Case No. 387, *A Review of the Adequacy of Kentucky's Generation Capacity and Transmission System* (Ky. PSG Dec. 20, 2001).

EAST KENTUCKY POWER COOPERATIVE, INC.
PSC CASE NO. 2015-00134
SUPPLEMENTAL INFORMATION REQUEST RESPONSE

COMMISSION STAFF'S SUPPLEMENTAL INFORMATION REQUEST DATED 08/28/15
REQUEST 20
RESPONSIBLE PERSON: **Jerry B. Purvis**
COMPANY: **East Kentucky Power Cooperative, Inc.**

Request 20. Refer to the response to Staff's First Request, Item 66 regarding the Clean Power Plan ("CPP") and the newly created National Uniform Carbon standards.

Request 20a. Having had the opportunity to further study the details of the CPP since filing this response, what preliminary steps, actions, or choices has EKPC considered, or identified, in relation to future compliance with the final rule?

Response 20a. EKPC's review of the Clean Power Plan and National Uniform Carbon standards is ongoing. Because there are numerous uncertainties regarding how the Clean Power Plan will be implemented, EKPC has not made any compliance decisions yet. EKPC is working with outside legal counsel, environmental consultants, internal experts, Utilities Information Exchange Kentucky, the Commission, and the

Kentucky Energy and Environment Cabinet ("Cabinet") to review EPA's final rules for new, existing resources and the Federal Implementation Proposed plan ("FIP") in the context of the state's very limited compliance options. EKPC is evaluating EPA's proposed FIP plan to determine whether to provide comments on their proposal. Once EKPC understands the suite of Greenhouse rules, the New Source Performance Standard for CO_2 under Section 111(b) of the CAA, the Clean Power Plan, and the FIP, also known as the Model plan, EKPC will evaluate all feasible compliance scenarios. EKPC's management and Board of Directors will review the results and decide what is in the best interest of the Owner-Members. EKPC will continue to work with the Cabinet and the Commission in regards to the new EPA regulation.

Request 20b. Under the final CPP rule, generally explain the impact of EKPC's proposed acquisition of Bluegrass's existing simple-cycle combustion turbine facilities under both a rate-based scenario and a mass-based approach.

Response 20b. Simple-cycle combustion turbines are not "affected EGUs" and are not regulated by EPA's final Clean Power Plan. This is true under a rate-based plan and a mass-based plan. The Clean Power Plan does not limit emissions from operation of the Bluegrass units. The only constraints on operation of the Bluegrass simple-cycle combustion turbines will be the price of natural gas and the number of hours of operation

allowed by the existing Title V air permit. EKPC expects that the value of the Bluegrass Units will be enhanced in light of the Clean Power Plan.

Request 20c. As set forth under the final CPP rule, identify the advantages and disadvantages of a rate-based approach as compared to a mass-based approach and explain which of the two compliance regimes would be more achievable from EKPC's perspective.

Response 20c. As outlined in Response 20a, EKPC is reviewing the advantages and/or disadvantages of rate- and mass-based plans under the final Clean Power Plan; hence, it is premature for EKPC to opine on whether a rate-based plan or mass-based plan is more or less advantageous.