Kentucky Public Service Commission

Staff Report on the

2012 Integrated Resource Plan

of East Kentucky Power Cooperative, Inc.

Case No. 2012-00149

September 2013

SECTION 1

INTRODUCTION

807 KAR 5:058 was promulgated in 1990 to establish an integrated resource planning process to provide for review of the long-range resource plans of Kentucky's six major jurisdictional electric utilities by the Public Service Commission Staff ("Staff"). The Commission's goal was to ensure that all reasonable options for the future supply of electricity were being examined and pursued, and that ratepayers were being provided a reliable supply of electricity at the lowest possible cost.

East Kentucky Power Cooperative, Inc. ("EKPC") filed its 2012 Integrated Resource Plan ("IRP") on April 23, 2012. The IRP includes EKPC's plan for meeting its customers' electricity requirements for the period 2012-2026. EKPC, a generation and transmission cooperative, supplies nearly 100 percent of the power requirements of 16 distribution cooperatives, its member-owners. The 16 member-owners are: Big Sandy RECC, Blue Grass Energy Cooperative Corporation, Clark Energy Cooperative, Cumberland Valley Electric, Farmers RECC, Fleming-Mason Energy Cooperative, Grayson RECC, Inter-County Energy Cooperative Corporation, Jackson Energy Cooperative, Licking Valley RECC, Nolin RECC, Owen Electric Cooperative, Salt River Electric Cooperative Corporation, Shelby Energy Cooperative, South Kentucky RECC, and Taylor County RECC. Collectively they provide service in 89 counties in central and eastern Kentucky. They serve primarily residential customers, which account for over 90 percent of their more than 520,000 retail customers.

EKPC owns and operates three coal-fired generating stations: the Dale, Cooper, and Spurlock stations. It owns and operates nine gas-fired combustion turbines located at its Smith Station. It purchases power from the Southeastern Power Administration ("SEPA"). EKPC also owns and operates roughly 16 megawatts ("MW") of landfill gas generation and has 400 MW of import capability via firm transmission rights from PJM Interconnection, LLC ("PJM"). Total generation and import capability available to EKPC, including the SEPA power, is approximately 3,500 MW.

On May 25, 2012, an Order was issued establishing a procedural schedule for this proceeding. The schedule allowed two rounds of data requests to EKPC, written comments by intervenors and reply comments by EKPC. Intervenors in this matter are Gallatin Steel Company and Sonya McElroy and the Sierra Club ("Sierra Club").

This report provides a review and evaluation of EKPC's 2012 IRP in accordance with 807 KAR 5:058, Section 11(3), which requires Staff to issue a report summarizing its review of each IRP and make suggestions and recommendations to be considered in future IRPs. Staff recognizes that resource planning is a changing, ongoing process. This review is designed to offer suggestions and recommendations to EKPC on how to improve its resource plan in the future. Specifically, Staff's goals are to ensure that:

- All resource options are adequately and fairly evaluated;
- Critical data, assumptions and methodologies for all aspects of the plan are adequately documented and are reasonable; and

- The report also includes an incremental component, noting any significant changes from the EKPC's most recent IRP, filed in 2009.

EKPC stated that the objective of its IRP was to economically and reliably serve its member-owners while simultaneously mitigating financial and operational risks. To meet this objective, EKPC identified the following near-term actions it would undertake:

- Continue to monitor economic and load conditions;
- Continue to refine its demand-side management ("DSM") evaluations and develop a reasonable and financially viable comprehensive DSM plan;
- Issue a Request for Proposals for power supply resources to address the existing capacity affected by the Environmental Protection Agency's ("EPA") Mercury and Air Toxic Standards ("MATS") rule;
- Continue to evaluate and monitor joint operating opportunities.

EKPC's total energy requirements are expected to increase by 2.0 percent per year from 2008-2028. Winter peak demand is expected to increase by 1.7 percent and summer peak demand is expected to increase by 1.9 percent for the same period. EKPC expects to need over 1,500 MW of additional resources to serve projected load by 2023.

EKPC's winter peak is expected to increase from 2,865 to 3,598 MW from 2011 to 2026, for an annual growth rate of 1.5 percent. Its summer peak is expected to increase from 2,388 to 2,645 MW over the same period, for a growth rate of 0.7 percent. Energy requirements are projected to increase from 12,674,890 Megawatt-hours ("MWh") in 2011 to 15,669,518 MWh in 2031, for an annual growth rate of 1.4 percent.

The IRP was developed based on a minimum reserve margin of 12.0 percent. Through its existing DSM programs, EKPC expects a reduction in winter peak demand of approximately 100 MW by 2026. If all of the programs are implemented, it forecasts a potential winter peak reduction from new DSM programs by 2026 of roughly 175 MW.

The remainder of this report is organized as follows:

- Section 2, Load Forecasting, reviews EKPC's projected load growth and load forecasting methodology.
- Section 3, Demand-Side Management, summarizes EKPC's evaluation of DSM opportunities.
- Section 4, Supply-Side Resource Assessment, focuses on supply resources available to meet EKPC's load requirements and environmental compliance planning.
- Section 5, Integration and Plan Optimization, discusses EKPC's overall assessment of supply-side and demand-side options and their integration into an overall resource plan.

SECTION 2

LOAD FORECASTING

This section reviews the projected load growth on EKPC's member-owners' systems and EKPC's load forecasting methodology. EKPC prepares energy and peak demand 20-year forecasts[2] biennially as required by its primary lender, the United States Department of Agriculture Rural Development ("RD"). These 20-year forecasts are the starting point in the planning process employed by EKPC in determining the level of supply-side and demand-side resources that will be required to meet the needs of the customers of its 16 member-owners. It obtains much of the data used in developing its forecast from IHS Global Insight, Inc. ("Global"), a widely used consulting firm with utility industry expertise.

REGIONAL SERVICE AREAS

In the service areas of EKPC's members, electricity is the primary source for water heating and space heating. Roughly 87 percent of all homes have electric water heating, while approximately 60 percent have electric space heating. Average use by residential customers in 2011 was 1,187 kWh per month and is forecasted to be 1,185 kWh in 2026.[3]

EKPC has combined the service areas of its 16 member-owners into seven regions for purposes of forecasting economic activity in the members' service areas. The economies of these seven regions are quite varied. Areas near Lexington and Louisville have a fairly significant amount of manufacturing, while the area around Cincinnati has large numbers of retail trade and service jobs. Eastern and southeastern areas rely heavily on mining, while in the southern and southwestern areas, tourism accounts for a significant part of the economy.

ASSUMPTIONS

The key forecast factors and assumptions contained in the IRP and used in developing the forecasts for the 16 member-owners and EKPC included:

1. Regional population projections are based on forecasts from Global;

2. Residential customers are projected to increase by 118,000 over the forecast period, or approximately 1.4 percent annually, between 2011 and 2026;

3. Member-owners' service areas will experience modest economic growth; the regional population's average annual growth rate is forecasted to be 0.7 percent; the

[2] EKPC filed both a 15-year forecast, 2012-2026, and a 20-year forecast, 2010-2030. Unless noted otherwise, the contents of this report are based on information contained in the 15-year forecast.

[3] 2012 IRP, p. 40.

average unemployment rate rose to over 11 percent during 2010, and projections indicate it may take 10 years to recover to pre-recession levels.

4. Approximately 78 percent of new households will have electric heat; 87 percent of new households will have electric water heating; nearly all new homes will have electric air conditioning, (either room-sized units or central air);

5. Naturally occurring appliance efficiency improvements will decrease retail residential sales;

6. Residential customer growth and local area economic activity will be the major determinants of small commercial growth;

7. The forecasted load growth is based on normal weather, as defined by the National Oceanic and Atmospheric Administration's 30-year normals;[4] and

8. The load forecast incorporates future electricity prices and customers' responses to fluctuations in price.[5]

For many years, the customer growth of EKPC's member-owners exceeded regional population growth. This is because the rural areas served by some of its member cooperatives are less developed, resulting in more areas for development or expansion to occur. In turn, this resulted in the rural areas' experiencing greater growth than more urban and more developed parts of the seven regions in which its members are located. This trend continues in the latest forecast, which shows an average 0.7 percent growth rate in regional population,[6] but a 1.4 percent growth rate in residential customers.[7]

FORECASTING METHODOLOGY

EKPC and its member cooperatives, working together, prepare the individual load forecasts for each cooperative. EKPC then sums the members' forecasts to determine its own forecast. Several factors are given consideration in preparing the forecasts, including national, regional and local economic performance; appliance saturations and efficiencies; population and housing trends; service area industrial development; the price of electricity and its effects on customers' responses, household income; and weather. The final forecast reflects analyses of historical data as supplemented by the judgment and experience of member cooperative management and EKPC staff. Both low-case and high-case forecasts are prepared in recognition of the uncertainty associated with long-term forecasting.

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[4] According to EKPC's response to Item 7 of Staff's First Request, it used the 1971-2000 Climate Normals because the 1981-2010 Climate Normal update was released after the load forecast used in the 2012 IRP was developed.

[5] Technical Appendix - Volume 1, p. 31 (20-year forecast).

[6] 2012 IRP, p. 36.

[7] *Id.*, p. 39.

EKPC subscribes to Global, which collects historical county-level data for many economic variables, develops forecasting models based on the data, and provides the results to EKPC. The county-level data that EKPC receives from Global includes the following:[8]

1. Employment: per North American Industry Classification System;
2. Unemployment rate;
3. Labor force;
4. Personal income;
5. Wage disbursement, total non-farm;
6. Non-wage income;
7. Average annual wage, non-farm employment;
8. Per capita personal income;
9. Average household income;
10. Real personal income;
11. Real wage disbursement, total non-farm;
12. Real non-wage income;
13. Real per capita income;
14. Population, total and by age group; and
15. Heads of households, total and by age group.

EKPC combines Global's county-level projections into regional forecasts of economic activity for the seven regions into which it has grouped its members' service areas. Its forecasting methodology, with energy use dependent upon variables such as regional employment, personal income, regional population and weather, is comparable to the methodologies seen in other utilities' IRPs, with the exception of the time period used for establishing normal weather, which is the 30 years ended 2000.

Regional forecasts for population, employment, and income are developed and used as inputs to customer and energy forecasts for residential and small commercial customer classes. Energy sales to both these classes are forecasted using regression analysis, using typical variables such as electric prices, economic activity, and regional population growth.

The number of residential customers is projected using regression analysis. In all seven regions into which EKPC's members' service areas are combined, several electric utilities provide service. The portion of the customers in a region served by an EKPC member-owner is modeled in a "share" variable. Population "share", regional households, and household "share" are used in a regression analysis to produce a forecast of residential customers for each member system.[9]

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[8] Technical Appendix - Volume 1, p. 37 (20-year forecast).

[7] *Id.*, p. 51.

The number of small commercial customers is also projected using regression analysis of various regional economic data, along with the residential customer forecast. Variables include real electric prices and economic activity.

Large commercial and industrial loads are forecast by the member cooperatives and EKPC. The member cooperatives project loads of existing customers while EKPC forecasts new load based on historical development, the presence of industrial parks, and the service territory's economy.

Three relatively small customer classes included by EKPC are: (1) seasonal sales; (2) public building sales; and (3) other sales. Seasonal sales are sales to vacation homes and weekend retreats. Only one member reports such sales. Public building sales include sales to government building and libraries. Only two EKPC members report sales in this class. Other sales represent street lighting sales. Eleven EKPC members report such sales.

EKPC forecasts seasonal peak demands by summing monthly energy usage for the different customer classes and applying load factors for those classes. Residential energy use components are heating, cooling, water heating, and other. Using historical load factors, demand is calculated for each component and summed to derive the residential portion of the total seasonal peak demands. The small and large commercial customer class and the industrial customer class load factors are applied to energy usage for each of those classes to obtain their contributions to the system's total seasonal peak demands.

RESIDENTIAL ENERGY FORECAST

EKPC uses statistically adjusted end-use ("SAE") models to forecast residential energy sales.[10] This method uses detailed information on demographic and economic information, appliance saturation, use, and efficiencies, household characteristics, and weather characteristics. EKPC's SAE method segments household electric use into four components: heating, cooling, water heating, and other. The "other" component includes lighting and miscellaneous uses that do not fall within any other component.

The SAE model reflects over 20 years of end-use data used to forecast appliance saturation. It also captures appliance efficiencies resulting from government standards based on data from the federal Energy Information Administration Energy Outlook for the East South Central region of the country, which includes Kentucky. The SAE model reflects various demographic and socioeconomic factors including: the changing shares of urban and rural customers relative to total customers; number of people living in households; square footage of homes; and thermal integrity of homes.

[10] *Id.*, p. 57.

EKPC's appliance saturation projections are based on biennial customer surveys that it has conducted since 1981. The customer survey results are used to understand end-use customers' electricity consumption and project future appliance saturations. Analyses and forecasts of appliance saturation and appliance usage are performed using econometric models. Because the decision to purchase an appliance is separate from a decision on how to use an appliance, these two actions are modeled separately.

RESIDENTIAL SALES FORECASTING RESULTS

Recognizing the incremental impacts of existing energy-efficiency programs and based on the expectation that naturally occurring appliance efficiency improvements will decrease retail residential sales, EKPC forecasts that residential energy sales will grow at an average annual rate of approximately 1.4 percent. Use per customer is expected to remain relatively constant over the forecasted period due to the economy, increasing appliance efficiencies, and rising retail electricity prices. Residential sales, which were 6,980,187 MWh in 2011, are projected to increase to 7,388,272 MWh by 2017, 7,909,104 MWh by 2021, and 8,607,922 MWh by 2026,[11] the last year of the forecast period.

COMMERCIAL AND OTHER ENERGY FORECAST

The small commercial customer class consists of commercial and industrial accounts with peak demands less than 1 MW. Those customers with peak demands equal to or greater than 1 MW are classified as large commercial and industrial. Most commercial customers fall within the small commercial class. There were 34,155 small commercial customers on EKPC's system in 2011. That number is projected to increase to 43,647 by 2026, which represents an average annual growth rate of approximately 1.6 percent.

EKPC forecasts class sales by member system through regression analysis of historical data. Regressions for the small commercial class typically include customers as a function of residential customers, unemployment rate, and various other economic variables. The sales regression typically includes customers, electric prices, and other economic measures as explanatory variables.

Small commercial sales, which were 1,940,403 MWh in 2011, are projected to grow to 2,143,676 MWh by 2017, 2,325,327 MWh by 2021, and 2,555,519 MWh in 2026.[12] These increases represent an average annual growth rate of approximately 1.9 percent.

There were 127 large commercial and industrial customers on EKPC's system in 2011. The number of such customers declined between 2009 through 2011 due to the

[11] 2012 IRP, p. 40.

[12] *Id.*, p. 42.

weaker economy caused by the recent economic recession. However, EKPC projects the number of large commercial and industrial customers to increase at an average rate of approximately 2.5 percent annually, growing to 184, nearly 45 percent above the 2011 level, by the year 2026.[13]

Member-owners are in frequent contact with their large commercial and industrial customers. They also communicate frequently with local industrial development groups. Such contacts help maintain the cooperatives' awareness of their current customers' production and facility expansion plans, as well as the status of potential new customers. The load of the largest customer on the EKPC system, Gallatin Steel ("Gallatin"), is forecasted individually. Gallatin is on an interruptible rate and the forecast assumes it will be interrupted during peak periods, up to 360 hours per year.

Large commercial and industrial sales, which were 2,889,142 MWh in 2011, are projected to grow to 3,475,489 MWh in 2017, 3,744,699 MWh in 2021, and 4,065,600 MWh in 2026. This level of growth represents an average annual growth rate of 2.3 percent.

Other energy sales represent seasonal sales, sales to government buildings, and street-lighting sales. Together, these other energy sales, which account for less than one-half of 1 percent of the total sales of EKPC's members, are projected to grow from 57,652 MWh in 2011 to 77,353 MWh in 2026, for an average growth rate of approximately 1.8 percent.

TOTAL SYSTEM ENERGY FORECAST

EKPC's 2011 total system energy requirements, including office use by it and its member-owners, and transmission and distribution losses were 12,674,890 MWh. For its total system, EKPC forecasts its total energy requirements to be 13,467,975 MWh in 2017, 14,278,325 MWh in 2021 and 15,471,651 MWh in 2026, the last year of the forecast period, which reflects an average annual growth of approximately 1.3 percent.[14] EKPC's office use is projected to decline from 10,146 MWh in 2011 (Actual) to 9,001 MWh in 2026 (Forecasted). Transmission losses were estimated to be 3.3 percent for the forecasted period, while distribution losses were estimated to be 4.3 percent for the period.[15]

PEAK DEMAND FORECASTS

EKPC develops two peak-demand forecasts: one for its winter peak demand and one for its summer peak demand. Peak forecasting is intended to closely reflect the

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[13] *Id.*, p. 44.

[14] Response to Staff's First Request for Information, Item 8, June 25, 2012, p. 2.

[15] *Id.*

relationship of weather to peak load. EKPC is, and has been historically, a winter peaking system.

The data used to forecast seasonal peak demands includes:

1. Residential contribution to seasonal peaks is based on energy use for water heating, air conditioning, space heating, and residual loads. Load factors for each use are applied and peak demands are summed to build the seasonal class peak demand;

2. Small and large commercial contributions to seasonal peaks are based on aggregate class demands;

3. Normal weather is assumed for the forecast period; and

4. Transmission and distribution losses are reflected in the model.

Using the assumptions reflected in this section of the report, EKPC develops its base-case peak-demand forecast. In addition to its base-case forecast, EKPC develops low-case forecasts based on more pessimistic assumptions and high-case forecasts based on more optimistic assumptions.

To develop low-case and high-case forecasts, EKPC adjusted several of the variables in its base-case forecast. Those include weather, electric price, residential customers, and small and large commercial energy usage. Adjusting variables such as these, EKPC developed alternative forecasts to its base-case forecast:

Low-Case - Pessimistic economic assumptions with mild weather – lowest loads;

Base-Case - Most probable economic assumptions with normal weather – (Base Case pre-DSM);

High-Case – optimistic economic assumptions with severe weather – highest loads.

Using the 20-year load forecast, EKPC's weather-normalized winter peak demand in 2010-2011 was 3,018 MW. Its forecasted winter peak demands for 2015-2016 and 2025-2026 under these cases are as follows:

2015-2016[16]	2025-2026[17]
Low-Case - 2,923 MW	Low-Case - 3,213 MW
Base-Case - 3,241 MW	Base-Case - 3,883 MW

[16] Technical Appendix, Volume 1, p. 82 (20-year forecast).

[17] *Id.*

High-Case - 3,481 MW	High-Case - 4,454 MW

EKPC's weather-normalized summer peak in 2011 was 2,259 MW. Using the same variations in assumptions as for its winter peak demand, it developed summer peak demands in 2016 and 2026 as follows:

2016[18]	2026[19]
Low-Case - 2,142 MW	Low-Case - 2,320 MW
Base-Case - 2,436 MW	Base-Case - 2,931 MW
High-Case - 2,564 MW	High-Case - 3,259 MW

EKPC also applied these variations in assumptions to its base total energy forecast and developed a low-case and high-case total energy forecast. For calendar years 2016 and 2026, the results are as follows:

2016[20]	2026[21]
Low-Case - 12,241,270 MWh	Low-Case - 13,299,416 MWh
Base-Case - 13,902,392 MWh	Base-Case - 16,566,426 MWh
High-Case - 14,884,173 MWh	High-Case - 18,694,004 MWh

CHANGES FROM PREVIOUS FORECAST

EKPC's winter peak demand is expected to increase from 2,865 MW in 2010-2011 to 3,598 MW in 2025-2026, an average annual increase of 1.5 percent. Its summer peak demand is expected to increase from 2,388 MW to 2,645 MW over the same period, an average annual increase of 0.7 percent.[22]

These growth rates are less than those in EKPC's previous (2009) IRP. At that time, its total energy requirement reflected an average annual growth rate of 2.0 percent, compared to the rate of 1.5 percent in its current forecast. Its winter peak demand was projected to grow at a rate of 1.7 percent, compared to the 1.5 percent growth rate it now projects. According to EKPC, the lower forecasts are due mainly to less customer growth, increased efficiency levels, and lower expectations for economic growth. It indicated that these same factors were being seen in other parts of Kentucky, as well as in surrounding states.

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[18] *Id.*

[19] *Id.*

[20] *Id.*

[21] *Id.*

[22] 2012 IRP, p. 47.

INTERVENOR COMMENTS

Of the parties intervening in the IRP review, only the Sierra Club filed comments on EKPC's IRP. These comments generally consist of various criticisms of EKPC's forecasting process, forecasting results, and claims that EKPC's forecasting results resulted in improper decisions as to its future resource needs. The main points in these comments, as they relate to the load forecast, can be summarized as follows:

1. EKPC unreasonably assumes zero cost related to carbon dioxide ("CO_2") emissions over the next 15 years;

2. EKPC did not engage in sensitivity analyses to evaluate how a range of assumptions regarding factors such as load growth, fuel prices, emission allowance prices, etc., would impact its resource planning.

EKPC REPLY COMMENTS

In its response to the Sierra Club's comments, concerning its having assigned zero cost to carbon dioxide, EKPC stated that the inclusion of market purchases in its avoided cost includes the impact that CO_2 compliance is expected to have on the market prices. Market prices are taken from the forward price curve prepared by the Alliance for Cooperative Energy Services ("ACES") Power Marketing Group.[23] The forward price curve for power prices seeks to capture and reflect all regulatory and market price drivers, including the cost of carbon dioxide.

Regarding the Sierra Club's claims that it did not engage in sensitivity analyses around its forecasted load, EKPC stated that a range of distributions created four additional loads to define the high and low range of potential loads to be examined. The model draws load data a few days at a time from different forecasts (to represent weather patterns) to assemble the hourly loads to be simulated. Each iteration of the model draws a new load forecast to simulate. Actual and forecasted market prices, natural gas prices, coal prices, and emission costs are correlated to the load data used in the simulation. Five hundred (500) iterations are used in the model simulations.[24]

DISCUSSION OF COMMENTS / DISCUSSION OF REASONABLENESS

Staff is generally satisfied with EKPC's load forecasting approach, which is both thorough and well documented. Some of the major factors reflected in the forecast were: (1) nearly 60 percent of EKPC's member-system retail sales are to the residential class; (2) the average number of residential customers served by EKPC is expected to increase approximately 1.4 percent annually over the next 15 years; (3) the recent downturn in the economy in the areas EKPC's members serve; (4) reflecting increasing appliance efficiency; (5) incorporating rising electricity prices; and (6) projecting average

[23] ACES is a cooperative-sponsored organization of which EKPC is a member.

[24] EKPC's Feb. 11, 2012 Response to Comments of Sierra Club, p. 13.

monthly use per customer that is lower than in previous forecasts, all of which impacted EKPC's forecasted demand and energy results.

Regarding the claim that EKPC unreasonably assumes there will be zero cost related to CO_2 emissions over the next 15 years, EKPC's response that by including market purchases in its avoided costs it recognizes the impact that CO_2 compliance is expected to have on the market prices appears reasonable to Staff.

Regarding the claim that it did not engage in any sensitivity analyses around its forecasted load, EKPC stated that a range of distributions created four additional loads to define the high and low range of potential loads to be examined.[25] It went on to state that five hundred (500) iterations are used in the model simulations. This explanation also appears reasonable to Staff.

The total forecasting model and its results are reasonable, as were EKPC's responses regarding the forecasts. Staff concludes that EKPC provided an adequate explanation to the Sierra Club's criticisms of its load forecasts.

RECOMMENDATIONS FROM THE 2009 IRP LOAD FORECASTING SECTION

The Staff's recommendations in the Load Forecasting Section of its report on EKPC's 2009 IRP were as follows;

- Continue to report on how its actual energy and demand levels compare to its forecasted levels;

- Include a detailed analysis of the potential impact of future environmental requirements that may be applicable to burning fossil fuels (including, but not limited to, restrictions on emissions of CO_2 and other greenhouse gases, carbon capture and sequestration, and a tax on carbon), and an explanation of how these potential impacts are incorporated into EKPC's present forecasts or how the potential impacts will be incorporated into future forecasts; and

- Include a detailed analysis of how the impact of federal mandatory efficiency improvements for appliances are reflected in its demand forecasts as well as in the energy forecasts for its commercial and industrial customer classes.

EKPC reported on how its actual energy and demand levels compared to its forecasted levels (pages 13-15 of the 2012 IRP). Staff will repeat this recommendation for EKPC's next IRP.

[25] *Id.*

Regarding a detailed analysis of the potential impacts of future environmental requirements that may be applicable to burning fossil fuels, including, but not limited to, stricter CO_2 emissions and other greenhouse gases, carbon capture and sequestration, a tax on carbon, and an explanation of how these potential impacts are incorporated into its present forecasts or how the impacts will be incorporated into future forecasts, EKPC discussed this generally on page 174, Section 9.0 of its IRP. However, nowhere in the discussion did EKPC address the portion of the recommendation dealing with a tax on carbon. The Staff is continuing this recommendation for EKPC's next IRP.

The recommendation associated with a detailed analysis of how the impacts of federal mandatory efficiency improvements for appliances are reflected in its demand forecasts, as well as in the energy forecasts for its commercial and industrial customer classes, is discussed in general throughout the IRP (*See* EKPC's IRP pages 2, 4, and 20 along with the Technical Appendix - Volume 1, pages 21 and 31). However, no specific MW or MWh impacts are shown. The Staff is continuing this recommendation for EKPC's next IRP.

RECOMMENDATIONS REGARDING THE 2012 IRP LOAD-FORECASTING SECTION

Based on its review of all the data contained in the record of this case, Staff has the following recommendations for EKPC's next IRP filing in the load-forecasting area.

- EKPC should continue to report on how its actual energy and demand levels compare to its forecasted levels for the time periods between IRP filings.

- EKPC should continue to include a detailed analysis of how the impact of federal mandatory efficiency improvements for appliances are reflected in its demand forecasts, as well as in the energy forecasts, along with the associated values, for its residential, commercial and industrial customer classes.

- EKPC should continue to review the potential impact of new and pending environmental requirements, including carbon, and report separately how these requirements have been incorporated, along with their associated impacts, into its load forecasts and related risk analysis.

- EKPC should discuss and report separately the impact on demand and energy forecasts of any projected increases in the price of electricity to its ultimate customers in its next IRP. The price elasticity of the demand for electricity should be fully examined and discussed, and a sensitivity analysis should be performed.

- Provide detailed support for the climate data used to determine normal weather. This should include, but not be limited to, the length of time

chosen (i.e., 30 years or another period), the weather stations providing the data, a description of EKPC's efforts to attain the most current data available, and evidence showing that its methodology represents a reliable predictor of future weather for IRP purposes.

SECTION 3

DEMAND-SIDE MANAGEMENT

INTRODUCTION

This section addresses the DSM portion of EKPC's 2012 IRP. Since the Staff report was issued on the 2009 IRP in November 2010, EKPC has made a significant effort in planning, evaluating, and working on the implementation of a much larger-scale DSM portfolio. The expanded DSM portfolio is a result of EKPC's review of several sources, including Staff's recommendations in its report on the 2009 IRP; Commission orders in related cases involving DSM; feedback from the Kentucky Department of Energy, the Attorney General's office and other relevant state agencies; review of regional studies of energy-efficiency opportunities; the expertise of member cooperatives; the current programs and IRPs of other Kentucky utilities; and best-practice DSM programs offered by utilities around the country. In Case No. 2010-00238,[26] a settlement agreement was reached wherein EKPC agreed to initiate a collaborative to evaluate and assess its energy diversification portfolio to expand deployment of renewable energy and DSM programs. On January 31, 2012, EKPC's Demand-Side Management and Renewable Energy Collaborative ("Collaborative") approved a number of DSM recommendations (with the Attorney General abstaining from the vote) and provided them to EKPC management for consideration.

To facilitate the expansion of the DSM portfolio, EKPC has established a steering committee of member cooperative CEOs, member cooperative employees, EKPC employees and EKPC senior management to develop the programs and program implementation. In addition, in support of the recommendations by the Collaborative, EKPC will benchmark with other utilities for best practices and do research in the evaluation, measurement and verification ("EM&V") processes to identify more robust EM&V procedures that ensure savings are accurately captured as they apply to energy-efficiency and demand-response programs and initiatives, collectively DSM.[27]

EKPC considered and reported the theoretical potential of its DSM program in its IRP, but stated that it is neither prudent nor practical to expect to achieve all of the

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[26] Case No. 2010-00238, An Investigation of East Kentucky Power Cooperative, Inc.'s Need for the Smith 1 Generating Facility (Ky. PSC Feb. 28, 2011). The members of the Collaborative are EKPC, its 16 owner-member cooperatives, the Sierra Club, the Kentucky Environmental Foundation, Kentuckians for the Commonwealth, and the Office of the Attorney General, by and through his Office of Rate Intervention.

[27] 2012 IRP, p. 6.

theoretical results, especially in the short term.[28] Each DSM program was reconsidered given the specific EKPC demographic and economic data, as opposed to general industry data. Budget and resource constraints were also considered.[29] EKPC believes an aggressive but reasonable DSM goal would be to pursue an approximately 50 MW reduction in summer peak demand with a corresponding energy reduction of 27,848 MWh over a five-year period (2013-2017).[30] By 2026, EKPC estimated the theoretical reductions from new and existing DSM programs to achieve energy reductions of 818,324 MWh with corresponding winter and summer peak demand reductions of 417.4 MW and 419.1 MW, respectively.[31]

DSM PROGRAM SCREENING PROCESS

EKPC's DSM analysis is conducted on an aggregate basis, with all member cooperatives, combined, rather than on an individual cooperative basis. EKPC selects DSM programs to offer on the basis of meeting customer needs and resource planning objectives in a cost-effective manner. As discussed in the DSM section of Staff's 2009 IRP report, EKPC uses a two-step process in the evaluation of DSM programs: qualitative and quantitative screening. The qualitative screening process includes the following criteria for selection: customer acceptance, measure applicability, savings potential and cost-effectiveness. The criteria consider the customer, the measure, the savings, and the economics. Proposed measures were evaluated under each of the four criteria on a scale of 1-5. Measures which received a combined score of above 11 were passed to the quantitative evaluation process. In the 2009 IRP, measures had to receive a score of 15 or higher in order to be passed on to the quantitative evaluation process. In the quantitative evaluation process, measures were evaluated using the standard "California tests"[32] for cost-effectiveness.

In 2010, EKPC adopted Demand Side Management Option Risk Evaluator ("DSMore"), by Integral Analytics, as its evaluation software for the quantitative evaluation process. DSMore is a modeling tool for energy efficiency, DSM and demand response that correlates weather, loads and prices on an hourly basis. All of the standard DSM cost-effectiveness tests can be calculated using DSMore. Its main benefits are that it enables EKPC to evaluate DSM programs in terms of traditional cost-based methods and in terms of supply-side market-based methods as well as allowing

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[28] *Id.*, p. 4.

[29] *Id.*, p. 5.

[30] Responses to Item 1.a. of Commission Staff's First Request for Information ("Staff's First Request") dated June 25, 2012 and Item 9 of Sonia McElroy and Sierra Club's Initial Requests for Information dated July 17, 2012.

[31] Technical Appendix, Volume 2, pp. 13-14.

[32] California Public Utilities Commission and California Energy Commission, "Standard Practice Manual for Economic Analysis of Demand-Side Management Programs", Document Number P400-87-006, Dec. 1987.

the company to view results that reflect extremes in weather. In addition, DSMore uses an Excel interface, which makes the evaluation process less labor intensive.

EKPC evaluated 113 DSM measures for the 2012 IRP. Of these, ten represent existing DSM programs and 103 represent new DSM measures. Forty-three new measures passed the qualitative screening process and were carried on to the quantitative evaluation; however, some measures were combined into one program, and a few measures did not lend themselves to quantitative analysis, required additional research, or were set aside for other reasons leaving to total of 33 new measures that were prepared for quantitative evaluation. Significantly more DSM measures were carried to the quantitative analysis in the 2012 IRP than in the 2009 IRP. This is attributable to EKPC's adopting the Staff recommendation that it take a somewhat more flexible approach in its consideration of the measures coming out of the qualitative screening.[33]

The results of the quantitative screening process for the 33 new DSM programs for cost-effectiveness was generally favorable, as 27 of them produced a Total Resource Cost test ("TRC") benefit-cost ratio of greater than 1.0. Two programs had Participant Test ("PT") results below 1.0, and they also had TRCs below 1.0. The programs were compared against EKPC's marginal energy costs, marginal generation capacity costs, marginal transmission and distribution costs, and carbon-related fuel costs.[34]

In the final strategic stage of reviewing the new DSM portfolio, EKPC determined that two of the programs were in the pilot stage, two programs had TRCs of less than 1.1, and two required substantial customer investment, yet had low participant test scores. As a result, no impacts from these six programs were included in the final DSM portfolio. Therefore, 21 new programs were selected for implementation whose load impacts are not reflected in the base-case load forecast. These programs are projected to produce over $505 million of benefits and $250 million of net benefits (in 2012 dollars) on a total-resource basis over the 25-year period of the study.[35] They will require an investment of just over $256 million (2012 dollars) by EKPC, its member cooperatives, and participating customers in order to achieve these savings.[36]

EXISTING DSM PROGRAM DESCRIPTIONS

EKPC identified 13 existing residential or commercial/industrial DSM programs in the 2012 IRP. The program descriptions, as identified by EKPC, are as follows:

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[33] Technical Appendix, Volume 2, p. 1.

[34] 2012 IRP, p. 4.

[35] Technical Appendix, Volume 2, p. 3.

[36] *Id.*

1. Button-Up Weatherization Program – This program requires the installation of insulation materials or the use of other weatherization techniques to reduce heat loss in the home. Any retail member who resides in a stick-built or manufactured home that is at least two years old and uses electricity as the primary source for space heat is eligible. In the future, EKPC expects to redesign its residential weatherization offering to a holistic approach with multiple tiers. The Button-Up program would be provided in the first tier.

2. Button-Up Weatherization with Air Sealing Program – This program has the same requirements as the above Button-Up program; however, in addition, EKPC offers an option to also seal the envelope of the home. A blower door test will be required to demonstrate the impact in kW demand reduction. An added incentive will be paid based on that reduction. . . . In the future, EKPC expects to redesign its residential weatherization offering to a holistic approach with multiple tiers. The Button-Up program would be provided in the first tier.

3. Air Source Heat Pump Retrofit Program – This program provides incentives for residential customers to replace their existing resistance heat source with a high efficiency air source heat pump. Homeowners applying for this incentive must install an air source heat pump that is the 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 old or older to qualify for incentives.

4. Electric Thermal Storage Incentive Program – Electric Thermal Storage ("ETS") 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. This improves the utility's load factor, reduces energy costs for the retail member, and delays the need for new peak load capacity expenses. Since the ETS technology is designed primarily to save kW on peak days, it can also be treated as a demand response program. EKPC will be exploring the advantages and disadvantages of treating ETS as a demand response program instead of a discounted rate program.

5. Direct Load Control of Residential Air Conditioners and Water Heaters Program – The objective of this program is to reduce peak demand and energy usage through the installation of load control device on residential air conditioners and electric water heaters. The priority appliance is the central air conditioners and homes with central air condition will be targeted by marketing efforts.

6. Residential Efficient Lighting with Retailers Program – The purpose of this program is to transform the market for residential lighting by facilitating a shift in consumer purchasing decisions from market baseline efficiency to higher efficiency lighting products. The program is designed to enter into a partnership with the retail establishments that provide residential lighting products within EKPC's service territory. EKPC will sponsor aggressive marketing and promotion activities designed to educate the customer, and will establish and nurture partnerships with key retailers including the development of point of sale marketing materials. EKPC will underwrite certain discounts and incentives for compact fluorescent and LED light bulbs that are sold to

residential members of EKPC distribution cooperatives according to agreements and procedures established between EKPC and the retailers.

7. Tune-Up HVAC with Duct Sealing Program – This program offers the following measures:

- Cleaning indoor and outdoor heat exchanger coils
- Changing filters
- Measuring the temperature differential across the indoor coil to determine proper compressor operation
- Checking the thermostat to verify operation and proper staging
- Sealing the ductwork, either through traditional mastic sealers or with the *Aeroseal* duct sealing program.

Duct loss measurement requires the use of a blower door test (before and after the duct sealing work is performed). Duct leakage per system must be reduced to below 10% of the fan's rated capacity. All joints in the duct system must be sealed with foil tape and mastic. Only contractors trained or approved by EKPC may be used.

In the future, EKPC expects to redesign its residential weatherization offering to a holistic approach with multiple tiers. The Tune-Up program would be provided in the first tier.

8. Touchstone Energy Home – This program is designed to encourage new homes to be built to higher standards for thermal integrity and equipment efficiency, as well as to choose a geothermal or an air source heat pump rather than less efficient forms of heating and cooling. The program is modeled after the ENERGY STAR V2.0 for New Homes program. Homes built to Touchstone Energy Home Standards typically use 30% less energy than the same home built to typical construction standards. Plans are submitted before the home is built, a pre-drywall inspection is made, and a blower door test is administered after the home is built to verify the home meets the standard.

9. Touchstone Energy Manufactured Home – The Touchstone Energy Manufactured Home is an all-electric manufactured home that is built to Energy Star specifications. A manufactured home that is built to these standards typically uses 30% less energy. The Touchstone Energy Manufactured Home includes a sealed duct system, energy efficiency double-pane windows, added insulation in the roof and wall, and an improved gasket that seals the halves of the home together. Buyers of qualified manufactured homes receive a rebate from their local cooperative.

10. Commercial & Industrial Advanced Lighting Including LED Program – This program offers incentives to commercial and industrial customers to install high efficiency lamps and ballasts in their facilities. LED exit signs, T-5 fluorescent fixtures, and advanced controls are examples of eligible technologies.

11. Industrial Compressed Air Program – Compressed air is an essential element in a wide variety of operations found in manufacturing. Compressed air production and distribution represents one of the primary electricity costs in many

industrial plants. Both the supply side (compressors and conditioning equipment) and the demand side (distribution and end use) can be targeted to significantly improve energy efficiency.

This program is designed to reduce electricity consumption through a comprehensive approach to efficient production and delivery of compressed air in industrial facilities. The program includes (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 shall conduct an ultrasonic air leakage audit and provide the results of this audit to the customer. The report will have an estimate of the amount of excess load in kW that the leaks are causing. The report will include a list of leaks detected. Upon completion of the repairs to the system, EKPC will conduct a follow-up audit and measure the difference in kW leakage load. Rebates will be paid based upon the difference in the kW leakage load.

12. Gallatin Steel Interruptible – The objective of this program is to reduce peak through implementing a special interruptible contract with EKPC's largest retail customer, Gallatin Steel. The Gallatin Steel Plant is a thin-slab mill whose electric load consists primarily of electric arc melting furnaces. EKPC and its member cooperative, Owen Electric Cooperative, Inc. (the EKPC member cooperative that serves Gallatin), have entered into a long term agreement with Gallatin Steel that provides certain demand credits to Gallatin for the right to interrupt load at Gallatin on a ten minute or ninety minute notice.

13. Interruptible Program – This program offers incentives to large commercial and industrial customers in return for allowing the utility to interrupt their load. The customer signs a contract for a special interruptible rate. Customers are notified that a power interruption is to begin at a specified time. The customer then reduces their load to a pre-determined firm level. In return for allowing the utility to interrupt this load, the customers are given a monthly credit on their demand charge for all demand above the firm capacity requirements. The credit amount varies, depending on the length of the notice required and the maximum number of hours per year that the load can be interrupted.

NEW DSM PROGRAM DESCRIPTIONS

EKPC identified 21 new residential or commercial/industrial DSM programs in the 2012 IRP. The program descriptions, as identified by EKPC, are as follows:

1. "Beat the Peak" Residential Demand Response – This program is a voluntary residential demand response program that uses technology to influence customers to reduce their consumption during periods of very high power costs or a critical shortage of generation.

2. Energy Star Central Air Conditioners – This program is designed to provide incentives to residential retail members to purchase ENERGY STAR qualified

air conditioners. The program also features services to members to insure proper installation and sizing of installations, factors which have been shown to be critical aspects of producing and maintaining energy savings with central air conditioners.

3. Geothermal Retrofit – This program is designed to provide incentives to residential retail members to replace working but inefficient (SEER 11 or less) air source heat pumps with geothermal heat pumps.

4. Home Energy Information – This program uses information to help customers manage their energy use by providing reports that compare their energy use to the energy use of similar households. The program combines customer-specific energy usage data with demographics and housing data to produce specific, targeted recommendations to motivate the customer to install energy efficiency measures and save electricity.

5. Low Income Weatherization Program – This program is designed to deliver weatherization energy efficiency services to existing residential low income customers base on cutoffs for household Income. It is anticipated that the homes will be primarily single family owner occupied homes.

The low income program Is distinct from other residential weatherization programs because part of the housing stock is often older and substandard in comparison to middle and upper income housing. As a result, certain repairs may be required in order to install the energy efficiency measures over and above what would be required in other housing stock. In some cases, there will be health and safety concerns that will need to be addressed as part of the work.

The program is designed to work in tandem with the state Weatherization Assistance Program by reaching more low income households sooner with the full set of measures that are cost-effective. Weatherization measure to be provided include insulation, air conditioner tune-up, duct sealing, air sealing, programmable thermostats, hot water conservation measures, and compact fluorescent light bulbs. EKPC will pay the full cost of installing these measures in the low income program.

6. Mobile Home Retrofit Program – This program focuses on the unique needs of east Kentucky's mobile home market. The construction design of mobile homes makes certain weatherization retrofits (primarily insulation) more challenging to install. On the other hand, there are more opportunities to save energy, particularly in older mobile homes (constructed before 1994 and especially those that were built before 1976 when the first HUD standards were issued). Mobile homes typically use more energy per square foot than site-built homes.

Measures that will be offered in the mobile home retrofit program include: duct sealing, attic insulation, air sealing, air conditioner/heat pump tune-up, programmable thermostats, incentives for replacing inefficient refrigerators, water heater measures, and compact fluorescent bulbs.

7. Programmable Thermostat with Electric Furnace Retrofit – This program is designed to provide incentives to residential retail members to install programmable

thermostats. Property installed programmable thermostats save 5-10% of heating and cooling energy. The program is designed for residential customers who heat their homes with electricity but do not have a heat pump. Some studies have shown that programmable thermostats can significantly increase morning peak loads when used with heat pumps.

8. Direct Load Control of Residential Pool Pumps - The objective of this program is to reduce peak demand through the installation of load control switches on residential pool pumps. Peak demand reduction is accomplished by cycling equipment on and off according to a predetermined control strategy. It is anticipated that the pool pump loads will be completely curtailed during control events. The typical control event duration will be four hours. Participating customers receive an annual bill credit incentive. EKPC will offer an incentive of $10 per year for each pool pump under control.[37]

EKPC plans to treat the pool pump as an add-on appliance to the Direct Load Control program it is currently implementing. The third party administrator in that program will also provide enrollment, installation, service calls, and measurement & verification services for the pool pump component.

9. Advanced Weatherization Tier 2 – EKPC plans to introduce a new approach to residential weatherization that establishes three tiers of weatherization measures, where the energy savings and customer incentives increase for each higher tier. This program represents the second tier. It includes all of the measures in the current Button-Up with Air Sealing and Tune-Up programs (Tier 1), plus additional levels of insulation and air sealing that increase the savings to 150% of the BTU heat reduction in Tier 1. The program will reduce duct leakage to at or below the 2009 IECC level. The program will also identify and complete a continuous thermal envelope with air barrier.

10. Advanced Weatherization Tier 3 – EKPC plans to introduce a new approach to residential weatherization that establishes three tiers of weatherization measures, where the energy savings and customer incentives increase for each higher tier. This program represents the highest tier, Tier 3. It includes all of the measures in the current Button-Up with Air Sealing and Tune-Up programs (Tier 1), plus additional levels of insulation and air sealing that increase the savings to 200% of the BTU heat reduction in Tier 1. The program will reduce duct leakage to at or below the 2009 IECC level. The program will also identify and complete a continuous thermal envelope with air barrier.

11. Energy Star Clothes Washers – This program is designed to provide incentives to residential retail members to purchase ENERGY STAR qualified clothes washers. Through superior design and system features, ENERGY STAR qualified clothes washers clean clothes using 50% less energy than standard washers.

[37] The incentive was increased to $20 for the IRP evaluation. *See* the response to Item 33 of Commission Staff's Second Request for Information ("Staff's Second Request"), Aug. 20, 2012.

ENERGY STAR clothes washers use less water per load, saving energy needed to heat the hot water. In addition, ENERGY STAR clothes washers extract more water from clothes during the spin cycle. This reduces drying time, thereby saving energy needed to dry clothes.

12. Commercial & Industrial Demand Response – This demand response program is designed to provide incentives to large customers to reduce their electricity demands on the grid, with short notice (less than 24 hours), for short periods of time, in response to short term conditions external to the customer facility. Typically, those conditions will be either an excessively high price or a shortage of available power. Participants are reimbursed for the cost of the smart meter needed, and receive an annual incentive of $30 per kW offered.

13. Industrial Process Efficiency – This program provides financial and engineering resources to industrial customers to save electricity in their industrial process. Incentives are structured as a standard offer payment per 1st year kWh with partial payment upon approval of the engineering proposal, and final payment on verified savings. The program as designed includes an audit, a feasibility study, proposal review and approval, and savings verification.

14. Industrial Variable Speed Drives Programs – This program is designed to promote variable speed drives ("VSD") and drive systems. The design includes efforts to promote wider application of VSDs. This will be provided as a rebate program with a mail in form.

15. Commercial Energy Management and Control Systems – This program is designed to provide medium & large commercial customers incentives for installing systems of controls and sensors that control and reduce a building's energy usage. Incentives are offered for new systems, replacing non-working systems and adding functionality to existing systems.

16. Direct Load Control for Commercial Air Conditioning – The objective of the program is to reduce peak demand and energy usage through the installation of load control switches on commercial air conditioners. Peak demand reduction is accomplished by cycling equipment on and off according to a predetermined control strategy. Central air conditioning and heat pump units are cycled on and off. The typical control duration is four hours. Participating customers receive an annual bill credit incentive.

EKPC plans to rely on a third party administrator to provide enrollment, installation, service calls, and measurement and verification services. EKPC plans to offer an incentive of $40 per year for each commercial air conditioner being controlled by a switch. This recognizes the load contribution of the commercial facility. The air conditioner incentive will consist of a $10 per month bill credit during the four hot weather months (June through September).[38]

[38] Response to Item 35.a. of Staff's First Request, June 25, 2012.

EKPC has a goal of enrolling 6,000 commercial customers over the next five years. The participation goal represents a cumulative penetration of 20% of the current eligible market of commercial facilities with central air conditioning.

17. Commercial Building Performance Program – This program addresses the need to boost the energy performance of existing equipment and systems by offering building owners and managers proper tuning, operation and maintenance services for HVAC and other equipment in existing buildings. This program combines features of duct sealing with heat pump/air conditioning tune-up (for smaller buildings) and retro-commissioning (for larger buildings).

The heat pump/air conditioning tune-up package includes:

- All accessible ductwork sealed
- Filter changed/cleaned
- Thermostat checked/adjusted for proper function
- Indoor and outdoor coils cleaned
- Refrigerant charge checked and corrected if needed
- Airflow checked and corrected if needed

Retro-commissioning is the systematic process of ensuring that an existing building's energy systems operate in an optimal manner by examining actual performance against design performance. The majority of savings tend to come from adjusting the energy management systems and controls.

18. Commercial Duct Sealing – This program is designed to provide incentives to commercial customers to reduce air leakage from ducts in commercial buildings by sealing duct leaks. Duct loss will be measured before and after the duct sealing work is performed in order to determine savings. Only contractors trained or approved by EKPC may be used.

19. Commercial Efficient HVAC Program – This program promotes high efficiency packaged HVAC equipment. It provides incentives for unitary commercial air conditioner and heat pumps that exceed the 2006 Federal guidelines for 13 SEER and 7.7 HSPF.

20. Commercial New Construction Program – This program promotes integrated design, commissioning, and more advanced technologies in commercial new construction. Electricity savings are realized across a number of end-uses, with the majority occurring from lighting, cooling, and heating. It is anticipated that new K-12 schools would be served by this program.

21. Small Commercial and Industrial Audit – This program is designed to deliver energy efficiency services to existing small commercial and industrial facilities. These facilities are typically more difficult to reach with services than large commercial

and industrial facilities and face unique obstacles to procuring and financing energy efficiency products and services. The program will consist of walk-through energy audits provided for no or nominal cost to small businesses and non-profits who expressed interest in investing in energy efficient equipment. During the audit, very cost effective measures that are easy to install (primarily lighting measures) are installed at no charge to the customer. Financing and rebates are offered for more capital and/or labor intensive measures.

REAL TIME PRICING PILOT

In Case No. 2007-00165,[39] the Commission approved EKPC's three-year Real Time Pricing ("RTP") pilot program for commercial and industrial customers designed to assist customers in making energy usage decisions based upon the utility's true cost of providing incremental energy. RTP Tariffs were subsequently filed by EKPC, Blue Grass Energy Cooperative Corporation, Licking Valley Rural Electric Cooperative Corporation, Nolin Rural Electric Cooperative Corporation and Owen Electric Cooperative, Inc.

Since EKPC's RTP tariff became effective, no customers of any participating member cooperative have requested to participate in the pilot program. There have been informal discussions between potential participants and the member cooperatives wherein both interest and concerns have been expressed by potential participants about the pilot program.[40]

EKPC was required to file annual reports by March 31st of each year on the 3 year pilot program with the Commission and with the Attorney General. The pilot program ended December 31, 2012 and in conjunction with its March 31, 2013 report, EKPC was to submit a detailed evaluation of the pilot program which the Commission will examine in order to determine whether the program should be continued.

HEAT LOAD MANAGEMENT RESEARCH PROJECT

EKPC has implemented a research project to determine the feasibility of managing heat loads as the winter peak levels are driven by residential resistant heat loads. The research project will evaluate the technical capabilities, kW and kWh impacts, and customer comfort impacts when the utility manages heat pumps. Over the next two winters, the research program will evaluate managing both the compressors and the emergency electric resistance heat pumps.

[39] Case No. 2007-00165, Application of East Kentucky Power Cooperative, Inc. for an Order Approving a Pilot Real-Time Pricing Program for Large Commercial and Industrial Customers (Ky. PSC Feb. 1, 2008).

[40] 2012 IRP, p. 109.

COMMENTS OF SONYA MCELROY AND SIERRA CLUB

Sonya McElroy and the Sierra Club (collectively "Sierra Club") maintain that EKPC's approach to DSM is outdated and fails to seize the opportunities presented by the growing availability of low-cost DSM programs and renewable energy sources. Sierra Club also states that EKPC's IRP fails to satisfy the standards of Kentucky law because EKPC could achieve far higher levels of energy savings through DSM than the goal set forth in the IRP.

Level of Savings

Sierra Club states that EKPC "is neither achieving nor projecting to achieve anything near the levels of energy savings that are readily achievable, much less pursuing DSM in an aggressive manner."[41] It also states that "[e]xperience throughout the country shows that well-designed and implemented DSM programs can reduce energy demand by 1% to 2% per year at a significantly lower cost than it takes to produce that same amount of energy."[42] Sierra Club maintains that EKPC's own IRP, as well as an October 2009 national study performed by the Electric Power Research Institute (for EKPC's residential customers only), demonstrates that far higher levels of cost-effective DSM can and should be pursued.

Sierra Club, in its original and supplemental comments, suggests that EKPC's current and future programs be more aggressive and effective than the initial offerings as they have the potential to partially insulate its ratepayers from both reliability risks and substantial capacity market price increases, but only if EKPC bids the peak savings from its DSM programs into PJM's capacity market's base residual auction ("BRA").[43] Sierra Club points out the risks inherent in bidding efficiency resources into the capacity market but states that there are major adverse financial consequences for its customers for declining to participate. It further suggests in its supplemental comments that EKPC has not performed basic diligence regarding the bidding of efficiency resources into PJM capacity auctions and recommends that the Commission initiate a review, including stakeholder involvement, to ensure that EKPC is planning to participate in the May 2013 BRA in ways that will mitigate the impact of potential increases in capacity prices on its customers.

[41] Comments of Sierra Club on the 2012 Integrated Resource Plan of East Kentucky Power Cooperative, Inc., filed Jan. 15, 2013, p. 4.

[42] *Id.*, p. 3.

[43] *Id.*, p. 11, and Supplemental Comments of Sierra Club on the 2012 Integrated Resource Plan of East Kentucky Power Cooperative, Inc., filed Feb. 11, 2013, p. 2.

Sierra Club suggests that EKPC should provide detailed reporting on its energy-efficiency programs and their relationship to the IRP.[44] It discusses the importance of energy-efficiency reporting and provides guidelines for reporting that provide basic information in a format that makes it straightforward to support energy and environmental planning or analyses. Sierra Club recommends that EKPC establish an energy-efficiency reporting process so that Commission Staff and other stakeholders can be kept aware of the programs' progress. It suggests a timetable for reporting energy-efficiency programs be quarterly, and that an annual report be made publicly available in the first quarter of the year following the program year completed. Sierra Club also recommends that the Common Statewide Energy Efficiency Reporting Guidelines contained in its comments be used by EKPC.

EKPC REPLY COMMENTS

Level of Savings

EKPC states that Sierra Club assumes that if EKPC offers the maximum level of DSM programs, all modeled savings will occur. EKPC maintains that Sierra Club fails to take into consideration the willingness or the ability of the retail customers to participate in DSM and energy-efficiency programs due to the predominantly rural service territories it serves and the general economic conditions, as well the specific financial condition of customers within those territories.[45] EKPC points out that several of the distribution cooperatives have significant levels of their customer bases that are at or below the poverty line, and such customers cannot afford to participate in DSM programs. Furthermore, it states that the income per capita in area served by EKPC and its 16 member-owners is $19,779, which is 9.9 percent less that the state average and 25.1 percent less than the national average.

EKPC noted that both the Commission and Sierra Club have recognized in prior cases that the level of DSM achievable in rural service territories is less than in the service territories where customers are in a better financial condition, and EKPC serves some of the most impoverished territories in Kentucky. As a result, EKPC stresses that Sierra Club should take into consideration the financial condition of its customers in determining the level of achievable DSM, especially when compared with other companies and other states.

EKPC also identifies the cost of electricity to its residential customers as another factor affecting the level of achievable DSM.[46] EKPC contends that Sierra Club has not

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[44] Comments of Sierra Club on the 2012 Integrated Resource Plan of East Kentucky Power Cooperative, Inc., filed Jan. 14, 2013, p. 14.

[45] EKPC's response to Comments of Sierra Club on the 2012 Integrated Resource Plan of East Kentucky Power Cooperative, Inc., filed Feb. 11, 2013, p. 2.

[46] *Id.*, p. 4.

acknowledged this in its comments, even though it is aware that a lower cost of electricity decreases the financial incentive to conserve and directly affects the cost-effectiveness of DSM programs and the comparability of EKPC's level of DSM as compared to other companies and states. EKPC contends that Sierra Club has chosen to compare its performance and the reasonableness of its DSM goals to a group of states that have higher electricity rates and very different legislative, regulatory and program structures, customer bases, and EM&V procedures that are not comparable to its own and should not be used to judge the level of achievable DSM in its territory.

EKPC states that it is committed to setting aggressive, yet reasonable, DSM goals. EKPC has engaged KEMA, Inc. ("KEMA") to assess its EM&V process, and KEMA has provided preliminary recommendations which are being evaluated. Once final recommendations are received from KEMA, EKPC will determine the best approach for its EM&V going forward. EKPC says it will continue to select its supply-side or demand-side resources using least-cost methodology with consideration for what the ratepayers in each of the member territories can realistically achieve.

EKPC states that it intends to offer its demand-response programs into the PJM capacity market, and that it is considering the possibility of offering its energy-efficiency programs into the PJM market, as well.[47] EKPC argues that, before doing so, the programs must first reach a number of participants and capacity prices must reach a level such that the anticipated capacity payments would exceed the increased measurement and verification and other administrative costs EKPC would incur to comply with PJM requirements.

DISCUSSION OF REASONABLENESS / RESPONSE TO 2009 RECOMMENDATIONS

The 2009 Staff Report made two recommendations regarding EKPC's DSM efforts. These recommendations were made in recognition of EKPC's projection of a substantial capacity deficiency and urged EKPC to aggressively pursue new DSM opportunities and implement new DSM programs that are reasonable and cost-effective. The recommendations were as follows:

1. EKPC should take a somewhat more flexible approach in its consideration of the measures that, based on the results of its qualitative screening, are carried on to the quantitative analysis.

2. EKPC should consider DSM as an environmental-compliance option as well as a resource option. EKPC should include a detailed discussion in its next IRP of its plans for implementing carbon and greenhouse gas mitigation strategies. (This is a continuation of one of the recommendations in the Staff's report on EKPC's 2006 IRP.)

[47] *Id.*, p. 7.

With respect to the first recommendation, EKPC took a more flexible approach in determining which DSM programs were passed from the qualitative to the quantitative analysis. In the 2009 IRP, in the qualitative screening process, measures had to achieve a score of 15 out of a possible score of 20 to be passed on to the quantitative analysis. In the 2012 IRP, measures had to achieve a score of above 11 out of a possible score of 20 to be considered for the quantitative analysis. As a result, 43 of the 113 DSM programs evaluated in the 2012 IRP were passed from the qualitative screening process to the quantitative screening process. In the 2009 IRP, 103 DSM programs were evaluated, but only 25 passed the qualitative screening process.

With respect to the second recommendation, EKPC stated that the cost of environmental compliance is taken into account in the avoided-cost calculations utilized in the California tests. The reduction in load due to DSM and the corresponding reduction in the volume of combustion pollutants were reflected throughout the plan, based on the reduced load to be served.

In the 2009 IRP, a value was set at $40 per ton for use in the Societal Cost test as an estimate of what future allowance prices could be in the marketplace with a cap-and-trade program. EKPC stated the since the 2009 IRP was filed, there has been no legislation passed dealing with carbon, so the cost of complying with environmental regulation is reflected in the avoided capacity and energy costs, and therefore, for the 2012 IRP, the value for the Societal Cost test was set at $0 per ton.[48]

In addition to its efforts to implement Staff's recommendations from the 2009 IRP Staff Report, EKPC also made other major enhancements in its DSM planning process since the 2009 IRP. Following is a list that includes several of the major enhancements:

1. Included future impacts of existing DSM programs explicitly in the load forecast per the direction of the Commission.

2. Provided further consideration and detailed analysis of available options to provide more energy and demand savings for customers with electric heat.

3. More comprehensive set of DSM measures evaluated, incorporated feedback from member cooperatives, the Attorney General, Kentucky Division of Energy, environmental stewards, and others. Most recently, engaged in this effort with members of the Collaborative formed out of Case No. 2010-00238.

4. Cost-Benefit analysis performed on a greater number of DSM measures by lowering the break-point on the Qualitative score.

[48] Response to Item 28 of Staff's First Request, June 25, 2012.

5. More ambitious targets for energy (MWh) savings established, to align the DSM portfolio with changing resource needs and to enhance the use of DSM as an environmental-compliance option.

6. Updated avoided costs for capacity to match current plans for transmission, distribution and generation investment (including environmental compliance costs).

7. Enhanced program designs to incorporate lessons learned in the field, as well as best practice in industry.

DISCUSSION OF REASONABLENESS / INTERVENOR COMMENTS / EKPC REPLY

Staff disagrees with Sierra Club's contention that EKPC's DSM programs are not achieving or projected to achieve the energy savings that are readily achievable or that EKPC is not pursuing DSM in an aggressive manner. We are encouraged by the aggressive and flexible approach EKPC has taken in its DSM analysis and the significant expansion of its DSM portfolio it has undertaken with its member-owners and the Collaborative. There are many new DSM programs, and they cannot be expected to be modeled as mature programs. Staff agrees with EKPC that the economic conditions in its members' territories, as well as the price of electricity, have been a deterrent to its DSM program performance. As a result, using other companies and other states as a guideline for achievable DSM for EKPC is not realistic. Nonetheless, Staff agrees with Sierra Club that EKPC should aggressively pursue cost-effective DSM opportunities. EKPC should work closely with its distribution cooperatives and stakeholders in the Collaborative to further educate and encourage them about the importance of DSM, energy efficiency, and energy conservation. Furthermore, with respect to existing, new, or expanding DSM programs, EKPC should assist its member cooperatives in rolling out these programs in order to achieve the goals expected of mature DSM programs.

Staff agrees with Sierra Club's suggestion that EKPC explore all opportunities in the PJM capacity markets and pursue all cost-effective opportunities that provide value to it and its ratepayers. Staff disagrees with Sierra Club's recommendation that the Commission initiate a review to ensure that EKPC plans to participate in the May 2013 BRA, but recommends that EKPC continue to study and pursue all cost-effective energy-efficiency and peak-demand reductions achievable so that all benefits of PJM integration can be realized.[49]

Staff agrees with Sierra Club's suggestion that EKPC provide reporting of its energy-efficiency programs and their relationship to the IRP. With respect to the energy-efficiency reporting process, EKPC is currently working on that project, and Staff is of the opinion that stakeholders and the Collaborative should establish energy-efficiency reporting guidelines and standards.

[49] This Includes EKPC's bidding its peak savings from DSM into the PJM capacity markets.

RECOMMENDATIONS

EKPC's current and proposed DSM programs represent a major effort to increase its achievable peak reductions and energy savings. These efforts should assist EKPC in avoiding a substantial capacity deficiency, as well as providing economic opportunities for EKPC, its customers, and other stakeholders. EKPC should endeavor to work with its Collaborative and steering committee in ramping up the deployment of the DSM portfolio so that the theoretical modeling contained in the IRP that can be implemented on a cost-effective basis can achieved to the greatest extent possible.

Although not cited in the prior discussion on the comments and reply comments filed in this matter, Staff notes the exchange between Sierra Club and EKPC regarding issues that have impacted the workings of the EKPC Collaborative. Staff encourages the parties to work through their differences in an open, professional manner in order that the Collaborative may continue to function in a non-adversarial manner on a going-forward basis.

Following are Staff's recommendations:

- EKPC should fine tune its DSM modeling projections in its next IRP in order to close the gap between its theoretical and actual peak demand and energy savings;

- EKPC should report on the work of its Collaborative and provide the dates of all Collaborative meetings that take place after the issuance of this report and prior to the filing of its next IRP;

- EKPC should include all environmental costs, as they become known, in future benefit/cost analyses;

- EKPC should continue studying the PJM capacity markets for economic opportunities related to its DSM and energy-efficiency programs and participate at the earliest, most practical time;

- EKPC should include an update on bidding its peak savings from DSM into the PJM capacity markets;

- EKPC should work with its member cooperatives to further educate and encourage them and their customers about the importance of DSM, energy efficiency, and energy conservation;

- EKPC should fully involve all members of the Collaborative to identify new cost-effective DSM programs, best practices, and opportunities for enhancement of its existing programs;

- EKPC should continue to work with stakeholders in developing energy-efficiency reporting guidelines, standards, and templates;

- EKPC should report, by year, on its DSM programs' energy savings and peak-demand reductions.

SECTION 4

SUPPLY-SIDE RESOURCES AND ENVIRONMENTAL COMPLIANCE

INTRODUCTION

This section attempts to summarize, review, and comment on EKPC's evaluation of existing and future supply-side resources. It also includes discussion on various aspects of EKPC's environmental compliance planning.

EXISTING CAPACITY

EKPC's first power plants were coal-fired plants built at the Dale Station in Clark County. The first two plants, rated at 23 MWs each, were constructed in 1954. The next two plants, each rated at 75 MWs, began operation in 1957 and 1960.

Subsequently, in 1965 at the Cooper Station, EKPC constructed a 116 MW unit near Somerset at Lake Cumberland and followed it four years later with a 225 MW unit. Both of these plants are coal-fired, and the second of the Cooper Station plants is retrofitted with pollution-control equipment that was placed into service in 2012.[50]

In 1977, EKPC constructed a 325 MW unit at the Spurlock Station on the Ohio River banks near Maysville, Kentucky. Four years later it added a 525 MW unit. Both plants burn pulverized coal and utilize flue gas desulfurization ("FGD") technology for pollution control. The final two coal-fired plants at the Spurlock Station utilize fluidized bed-boiler technology and are rated at 268 and 278 MWs, respectively.[51]

EKPC owns nine peaking natural gas/fuel-oil combustion turbines located in Clark County at the J.K. Smith site. The three ABB GT 111N2 combustion turbines individually have 110 MW summer and 149 MW winter ratings, while four GE 7EA combustion turbines each have a 70 MW summer and 100 MW winter rating. The two LMS 100 turbines separately have a 78 MW summer and a 101 MW winter rating.[52] In

[50] 2012 IRP, p. 54.

[51] *Id.*, p. 55.

[52] *Id.*

addition, EKPC owns and operates six landfill gas sites, with 15.2 MW of combined capacity.[53] The following table lists EKPC's existing facilities along with the total number of units at each facility, the primary and secondary fuel types, and the total capacity at each site.

EKPC EXISTING CAPACITY

FACILITY	UNIT	FUEL PRIMARY	FUEL SECONDARY	CAPACITY (MWs)
COOPER	1	COAL		116
	2	COAL		225
DALE	1	COAL		23
	2	COAL		23
	3	COAL		75
	4	COAL		75
SMITH	1	NATURAL GAS	FUEL OIL	150
	2	NATURAL GAS	FUEL OIL	150
	3	NATURAL GAS	FUEL OIL	150
	4	NATURAL GAS	FUEL OIL	98
	5	NATURAL GAS	FUEL OIL	98
	6	NATURAL GAS	FUEL OIL	98
	7	NATURAL GAS	FUEL OIL	98
	8	NATURAL GAS	FUEL OIL	97
	9	NATURAL GAS	FUEL OIL	97
SPURLOCK	1	COAL		325
	2	COAL		525
	3	COAL		268
	4	COAL		278
SIX PLANTS		LANDFILL GAS		15.2

[53] *Id.*

EKPC has a long-term agreement in place with the Southeastern Power Administration ("SEPA") for hydropower located at the Wolfe Creek and Laurel Dams. The 70 MW of power generated at Laurel Dam has been a reliable source of power, whereas the 100 MW at Wolfe Creek Dam has been unreliable for several years due to ongoing construction at the dam. This construction is projected to be completed in 2015, which should restore the long-term reliability of the power.[54]

In 2006, EKPC received a Certificate of Public Convenience and Necessity from the Commission to construct a 278 MW plant – the Smith 1 facility - in Clark County.[55] With the downturn in the economy in 2008 and 2009, EKPC revisited the need for the Smith 1 plant by commissioning a new load-demand study. The study results indicated a lower demand than was previously contemplated, and in Case 2010-00238, EKPC renounced its certificate for the coal-fired plant.[56]

Regarding projected future needs at the time of this filing, EKPC's generation expansion plan identified the possible demand for two new plants. The preliminary forecasts have indicated intermediate combined-cycle natural gas turbine plants as the technology EKPC proposes to implement. The new 250/275 MW (summer/winter) plants identified by EKPC are projected to be added in 2016 and 2023 at a yet to be determined site.[57]

The projected 2016 combined-cycle gas-fired plant addresses capacity issues created by bringing EKPC's current fleet, specifically Dale and Cooper 1 Stations, into compliance with the MATS rule. EKPC, on July 8, 2012, issued an RFP for up to 300 MW of power. The RFP results, received in September 2012, provide to the EKPC board economic information that is necessary for future plans, whether to bring the Dale and Cooper 1 plants into MATS compliance, build a new gas-fired, combined-cycle plant, or purchase 300 MW of power.[58] The EKPC board planned to have reviewed the results in early January 2013 and if, after evaluating the proposals, EKPC views purchasing power preferable to building capacity, it will not build the combined-cycle, gas-fired plant.[59]

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[54] 2012 IRP, p. 2.

[55] Case No. 2005-00053, The Application of East Kentucky Power Cooperative, Inc. for a Certificate of Public Convenience and Necessity, and a Site Compatibility Certificate, for the Construction of a 278 MW (Nominal) Circulating Fluidized Bed Coal-Fired Unit and Five 90 MW (Nominal) Combustion Turbines in Clark County, Kentucky (Ky. PSC Apr. 1, 2006).

[56] Case No. 2010-00238, An Investigation of East Kentucky Power Cooperative, Inc.'s. Need for the Smith 1 Generating Facility (Ky. PSC Feb. 28, 2011).

[57] 2012 IRP, p. 118.

[58] Response to Items 14.a. and 18.b. of Staff's First Request, June 25, 2012.

[59] Response to Item 4.g. of Staff's Second Request, Aug. 20, 2012.

On March 27, 2013, after reviewing 116 responses to its RFP, EKPC informally met with and updated senior-level commission staff. EKPC stated it was contemplating investing $15 million to bring the Cooper 1 facility into MATs compliance by 2015 and that it was still reviewing options concerning the Dale Units. EKPC made it clear that its plans were not yet fixed.[60]

EKPC's projected capacity needs for 2012–2026 are shown below. The existing resources include 170 MW from SEPA, and the forecast includes the impact of existing and new DSM programs.[61]

Projected Capacity (MWs)

Year	Projected Peaks		12% Reserves		Total Requirements		Existing Resources		Capacity Needs	
	Win	Sum	Win	Sum	Win	Sum	Win	Sum	Win	Sum
2012	3,006	2,334	361	280	3,367	2,614	3,250	2,821	117	*-207*
2013	3,002	2,323	360	279	3,362	2,602	3,067	2,813	295	-211
2014	3,016	2,332	362	280	3,378	2,612	3,067	2,813	311	-201
2015	3,063	2,376	368	285	3,431	2,661	3,117	2,863	314	*-202*
2016	3,106	2,422	373	291	3,479	2,713	2,845	2,591	634	122
2017	3,145	2,460	377	295	3,522	2,755	2,845	2,591	677	164
2018	3,187	2,499	382	300	3,569	2,799	2,845	2,591	724	208
2019	3,235	2,540	388	305	3,623	2,845	2,845	2,591	778	254
2020	3,270	2,569	392	308	3,662	2,877	2,845	2,591	817	286
2021	3,330	2,621	400	315	3,730	2,936	2,845	2,591	885	345
2022	3,379	2,662	405	319	3,784	2,981	2,845	2,591	939	390
2023	3,436	2,709	412	325	3,848	3,034	2,845	2,591	1,003	443
2024	3,481	2,749	418	330	3,899	3,079	2,845	2,591	1,054	488
2025	3,542	2,797	425	336	3,967	3,133	2,845	2,591	1,122	542
2026	3,598	2,843	432	341	4,030	3,184	2,845	2,591	1,185	593

RELIABILITY CRITERIA

EKPC's mission is to provide reliable, affordable energy and services to its 16 member-owned cooperatives. EKPC is a member of the Southeastern Reliability Corporation ("SERC").[62] As a member, it takes advantage of SERC's ability to resolve reliability issues, acts as a liaison for disputes, administers a regional compliance and enforcement program, and establishes reliability standards.

[60] Information contained in the summary of the March 27, 2013 informal conference held at the Commission's offices to discuss EKPC's upcoming CPCN/Environmental Compliance Plan application.

[61] 2012 IRP, p. 165.

[62] SERC serves as a regional entity with delegated authority from the North American Reliability Corporation ("NERC") for the purpose of proposing and enforcing reliability standards in all of portions of 16 central and southeastern states.

To provide reliable service, EKPC needs a margin above the projected peak demand. This reserve margin is necessary to account for operational reserves plus the uncertainties in the projected load and weather fluctuations. Historically, EKPC plans capacity to meet its winter peak load plus a 12 percent reserve margin.[63] It has been operating with a 12 percent reserve margin for numerous years, having performed its last reserve study in 2003. EKPC notes that while SERC does not prescribe a specific reserve margin, it requires a level of certainty which can only be met by holding an adequate reserve margin. EKPC states that using a 12 percent reserve margin has traditionally allowed it to provide power without curtailments.[64]

EKPC filed this IRP in April 2012. Afterward, it filed with the Commission and was granted full integration into PJM. PJM is a regional transmission organization ("RTO") that coordinates the movement of wholesale electricity and operates a capacity and energy market.[65] Since members' capacity requirements are based on PJM's peak, EKPC expects its full integration into PJM to result in planning capacity reserve benefits from being a winter peaking utility, whereas PJM peaks in the summer months. As EKPC's summer peak is approximately 20-25 percent less than its winter peak, its capacity reserve requirements are significantly less as a PJM participant than as a stand-alone utility.[66] As a fully integrated PJM member, EKPC can take advantage of available winter market capacity and available transmission and possibly forestall building its own capacity.[67]

As noted previously, EKPC currently uses a 12 percent planning capacity reserve margin based on a winter peak, which currently equates to retaining approximately 360 MW in both the winter and summer months. As a PJM member, reserve requirements are based on a contribution to the PJM system peak, and due largely to load diversity, EKPC will be required to maintain a planning reserve requirement of slightly less than 3 percent of EKPCs summer load, which equates to retaining roughly 70 MW during the summer season only. The ability to retain this lower reserve margin is a quantifiable benefit for EKPC.[68]

NERC requires that utilities have swift access to sufficient power to overcome the loss of a generation source. The power can be self-supplied or as is more common, available through an RTO or in partnership with neighboring utilities. At the date of this filing, EKPC was a member of a contingency reserve sharing group ("CRSG") with

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[63] 2012 IRP, p. 165.

[64] Response to Item 15 of Staff's First Request, June 25, 2012.

[65] Case No. 2012-00169, Application of East Kentucky Power Cooperative, Inc. to Transfer Control of Certain Transmission Facilities to PJM Interconnection, LLC. (Ky. PSC Dec. 20, 2012).

[66] Response to Item 4.g of Staff's Second Request, Aug. 20, 2012.

[67] Response to Item 3 of Staff's First Request, June 25, 2012.

[68] Case No. 2012-00169, Application of East Kentucky Power Cooperative, Inc. to Transfer Control of Certain Transmission Facilities to PJM Interconnection, LLC. (Ky. PSC Dec. 20, 2012), p. 13.

Kentucky Utilities/Louisville Gas and Electric ("KU/LG&E") and the Tennessee Valley Authority ("TVA"). With its full integration into PJM, the CRSG was no longer necessary for EKPC, as PJM has the ability and capacity to supply the necessary reserves. EKPC filed notice that KU/LG&E and TVA would permit EKPC to terminate its involvement in the CRSG per existing contract language on June 1, 2013, after it provided the required six-month withdrawal notice.[69]

SUPPLY-SIDE EVALUATION

EKPC evaluates power supply options as demand evolves, taking into account, among other things, the reliability and cost of the source. In assessing future resources, needs are evaluated on a present worth of revenue requirement and cash-flow basis.

EKPC used the RTSim model from SimTec, Inc. in developing its resource plan.[70] The model replicates EKPC's system as it supplies projected customer loads using a statistical range of inputs created from the actual EKPC load forecasts. It then runs more than 500 input iterations during the statistical load simulations.[71]

RTSim's Resource Optimizer was used to determine EKPC's optimal plan. The optimizer examines data from the production cost model simulation, except that future units are seen as resource options. The future units included: combined cycle, unit power purchase, peaking CTs, and base load coal units. EKPC also considered several renewable source inputs, including hydro, solar, distributed generation, and wind.[72]

The Resource Optimizer uses alternative power choices as inputs to the model, simulating thousands of potential resource combinations to determine the lowest cost plans. The lowest cost plans are determined from the present value of total production cost and annual fixed costs of future alternatives. Plans are tailored to meet certain criteria, and the present value of each plan is compared to remaining at status quo.

For this IRP, EKPC simulated 2,500 expansion plans, each with five iterations. The iterations varied fuels, forced outages, loads, and market prices to come up with the five lowest-cost plans, which were reviewed alongside recent experience to determine the plans feasibility.[73] EKPC indicates Plan 1 as the optimal plan, to build two 275 MW intermediate gas-fired combined-cycle power plants at a location to be determined later, constructing the first in 2016 followed by a second unit in 2023.

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[69] *Id.*, Letter filed in Case, Dec. 5, 2012.

[70] 2012 IRP, p. 157.

[71] *Id.*, p. 158.

[72] *Id.*, p. 159.

[73] 2012 IRP, p. 164.

Resource Optimizer Plan Summary (MWs) [74]

Year	Type	Plan 1	Plan 2	Plan 3	Plan 4	Plan 5
2012	peaking	200	200	200	200	200
2013	peaking	200	200	200	200	200
2014	peaking				7	
2015	peaking			30	30	
2016	base interim peaking	275[75]	275	275	200	110 100 100
2017	interim				275	
2018	peaking	100	100			
2019	interim peaking			100		275
2020	peaking	100				
2021	peaking		100	100		
2022	interim peaking	100	275			
2023	interim peaking	275		275	100	
2024	base					200
2025	interim				275	

Based on the Resource Optimizer results, EKPC indicates that the present value revenue requirement of each of the five identified resource plans to be the following:

	Present Value Revenue Requirements ($)
Plan 1	14,711,842,956
Plan 2	14,835,789,648
Plan 3	14,847,802,201
Plan 4	14,897,126,019
Plan 5	15,017,994,638

The present worth data is comparable between cases, but not on a total revenue requirement basis. The data includes fuel, variable O&M, emissions costs, purchased power costs, and fixed capital and O&M costs for new generation facilities.[76]

As stated earlier, EKPC issued an RFP for up to 300 MW of power. EKPC will compare the RFP responses for purchased power, to constructing a new combined-

[74] *Id.*, Table 8. (5)(a), p. 163.

[75] Response to Item 14.a. of Staff's First Request, June 25, 2012.

[76] Response to Item 14.c of Staff's First Request, June 25, 2012.

cycle intermediate power plant, and the cost of bringing the Dale and Cooper 1 plants into MATS compliance. EKPC is looking for the solution which presents the highest present value to place into service. EKPC further opines that PJM membership will likely push the 2023 combined-cycle plant out of the IRP planning period.[77]

COGENERATION, NET METERING, AND DISTRIBUTED GENERATION

EKPC has a cogeneration tariff on file with the Commission that allows qualifying facilities to sell excess power to it, or any of its member cooperatives, at published rates. It states that there are very few participants who take advantage of the filing; so few, in fact, that EKPC does not include cogeneration in its resource plan. There is, however, one facility which has operated in the service area since 1994, selling 563 MWh in 2010 and 980 MWh in 2011.[78]

EKPC similarly has a net-metering tariff which provides customers the choice of generating electricity using renewables. Net metering in EKPC accounts for just less than 300 kW of installed capacity. The majority of the 80 customers are small residential photovoltaic systems averaging approximately 2 kW, although one co-op has four 30 kW non-residential customers. There are three small-wind turbines in the service territory. The generation is considered in each cooperative's load plan, which is then submitted to EKPC to include in its overall resource plan.[79]

EKPC continues to look for economically viable distributed generation opportunities, yet due to the lack of installed distributed generation in its area, no consideration is given by EKPC to it in the resource plan. However, EKPC is interested in conceivably developing some "stranded gas" opportunities, specifically in eastern Kentucky. [80] EKPC believes that sites could possibly be created through economic development incentives.[81]

RENEWABLES

EKPC is a member of the National Renewables Cooperative Organization ("NRCO"). NRCO supplies EKPC with current renewable developments, information, and studies. This material provides EKPC the expertise to plan without having to expand its staff. As a member of NRCO, EKPC receives benefits from the organization's knowledge of the renewable industry and its numerous network contacts.

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[77] Response to Item 4.g of Staff's Second Request, Aug. 20, 2012.

[78] 2012 IRP, p. 21.

[79] *Id.*, p. 22.

[80] Jackson Energy RECC partners with Wellhead Energy Systems LLC to clean and compress gas from stranded natural gas wells to provide electricity. Kentucky Living Magazine, July 2011 (http://www.jacksonenergy.com/documents/July11.pdf).

[81] 2012 IRP, p. 23.

For instance, it has used this connection to NRCO to research possible local wind project opportunities that will enhance its generation-expansion plan.[82]

EKPC's existing generating portfolio includes several different renewable energy sources. Its member-owners takes advantage of hydro power,[83] solar, wind, and landfill gas generation, and EKPC is involved in researching the use of switchgrass and algae oils as alternative fuels.

As noted earlier, EKPC has a long-term agreement in place with SEPA for hydro power generated at the Wolfe Creek and Laurel Dams. The 70 MW of power generated at Laurel Dam has been a reliable source of power, while the 100 MW generated at Wolfe Creek Dam has been unreliable for several years due to ongoing construction at the dam. This construction is projected to be completed in 2015, which should restore the long-term reliability of the 70 MW of power.[84] The lock and dam system on the Kentucky River, which flows through the service territories of many of EKPC's member-owners, has been evaluated for possible future hydropower construction. To date, the economic assessments remain negative pertaining to low-cost energy production from the river.[85]

EKPC operates six landfill gas-to-energy plants within its territory which generated approximately 95,000 MWh in 2011. EKPC is pursuing new landfill gas production locations, yet notes a limited opportunity to expand to new sites.

EKPC is partnering with the University of Kentucky College of Agriculture and Kentucky Grassland Council to determine the feasibility of switchgrass as a co-firing generating fuel. It is likewise working with the Kentucky Center for Applied Research on an algae-to-fuel venture with the aim of reducing its carbon footprint. EKPC is exploring the viability of these and other possible carbon-friendly fuels.

OTHER NON-UTILITY SOURCES/COMPLIANCE PLANNING

EKPC does not specifically discuss non-utility sources in its resource assessment and acquisition plan, except to note that it does not purchase power from non-utility sources.[86]

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[82] *Id.*, p. 159.

[83] Salt River RECC purchases hydro power, generated on the Kentucky River near Shakertown, Kentucky from the Lock 7 Hydro Partners. The power is produced at the run-of-the-river 2,000 kW Mother Ann Lee hydroelectric station. (Louisville Magazine, Feb. 2010, p.33).

[84] 2012 IRP, p. 2.

[85] *Id.*, p. 160.

[86] *Id.*, Table 8.(4)(a), Note 3.

COMPLIANCE PLANNING

EKPC is currently in compliance with the following Clean Air Act ("CAA") Rules:

- New Source Performance Standards ("NSPS");
- New Source Review ("NSR");
- Title IV of the CAA and the rules governing pollutants that contribute to Acid Deposition ("Acid Rain Program");
- Title V operating permit requirements ("Title V");
- Summer ozone trading program requirements promulgated after Environmental Protection Agency ("EPA") action on Section 126 petitions and the Ozone SIP Call ("Summer Ozone Program");
- Clean Air Interstate Rule ("CAIR").[87]

EKPC anticipates being in compliance with the following CAA rules which could be in place over this IRP horizon:

- Green House Gas ("GHG") Tailoring Rule revisions to NSR;
- Cross-State Air Pollution Rule ("CSAPR") promulgated by EPA on remand of CAIR with the goal of replacing CAIR;
- Electric Generating Unit Maximum Achievable Control Technology rule, named the MATS rule when the final decree was issued by the EPA in December of 2011;
- National Ambient Air Quality Standards ("NAAQS") for Sulfur Dioxide ("SO_2"), Nitrogen Dioxide ("NO_2"), Carbon Monoxide ("CO"), Ozone, Particulate Matter ("PM"), Particulate Matter 2.5 microns or less ("PM 2.5"), and Lead;
- Clean Air Visibility ("Regional Haze") rule to protect National Parks and pristine areas designated as Class I areas by EPA.[88]

The EPA finalized the MATS rule on December 16, 2011 with the objective of reducing emissions of acid gases including hydrogen fluoride, hydrogen chloride ("HCL"), and heavy metals: mercury, arsenic, chromium, and nickel. Generators must comply with the mercury, SO_2, HCL, and particulate matter limits in MATS in the spring of 2015. EKPC has conducted emissions testing of its units, and the pollution control upgrades on Spurlock 1 and 2 and Cooper 2 place the units ahead of most units for compliance. Spurlock 3 and 4 are equipped with the best available control technology ("BACT") and are likely to meet the MATS rule without additional controls.[89]

[87] *Id.*, p. 170.

[88] *Id.*, p. 171.

[89] *Id.*, p. 172.

On July 6, 2011, the EPA finalized CSAPR with the goal of significantly reducing power plant emissions that contribute to ozone and fine particle pollution in other states. CSAPR significantly reduces SO_2 and NOx emissions that cross state lines and make it difficult for these downwind states to achieve the NAAQS standards. On December 30, 2011, CSAPR was stayed by the United States Court of Appeals for the District of Columbia. On January 4, 2013, it remanded CSAPR and ruled that the EPA must revise how it implements standards for fine particulates emitted by power plants. On June 24, 2013, the U.S. Supreme Court granted a petition from EPA and agreed to hear its appeal of the Court of Appeals' decision.

The GHG Tailoring rule views several gases in the aggregate as a single pollutant for NSR and sets compliance thresholds for the collection. The EPA considers CO_2, N_2O, SF_6, HFCs, PFCs, and methane ("CH_4") as a combined CO_2 equivalent, and if any of the EKPC generation stations undergo a modification that results in a CO_2 equivalent increase of 75,000 tons per annum, it must undergo a NSR which includes the analysis and implementation of BACT for the modified unit. EKPC has a future covenant from the EPA that allows some flexibility with respect to the NSR rules until December 31, 2015.[90]

On June 21, 2010, the EPA issued a notice of proposed rulemaking to regulate storage of coal combustion residuals ("CCR"). Although currently considered an exempt waste under the Resource Conservation and Recovery Act ("RCRA"), the EPA is considering reclassifying CCRs as either hazardous or "special" waste under RCRA Subtitle C, or regulating it as solid waste under Subtitle D.[91]

RCRA Subtitle C presents extensive repercussions and requirements which utilities may find hard to meet. RCRA Subtitle D seems the most likely course for the EPA, as it defines CCRs as solid waste.

Under the proposed Subtitle D regulations, there would be no liner requirements, only groundwater monitoring for existing impoundments. If existing or substantially constructed, landfills can be used for five years after the effective date of the regulation. All new landfills will be required to have a liner, leachate collection, and groundwater monitoring system. The regulations are still being litigated and are not yet final.[92]

EFFICIENCY IMPROVEMENT GENERATION

EKPC implemented the Maintaining Electrical and Generating Equipment Reliability ("MEAGER") program in 1987 to ensure the long-term reliability of its generating fleet. The objective of MEAGER is to develop a coordinated generator

[90] *Id.*, p. 173.

[91] *Id.*, p. 185.

[92] *Id.*, p. 31.

evaluation program while allaying escalating energy costs. The MEAGER plan is forward looking and covers the period from 2012–2016. The plan is comprehensive and the details can be reviewed in EKPC's application.[93]

EKPC aims to effectively manage operations through proper planning while ensuring compliance with current environmental regulations to provide reliable, economical electric service to its member systems and their retail customers. To prepare the current plan, EKPC:

- Reviewed the MEAGER 2000 Study;
- Reviewed the most current annual update prepared by EKPC;
- Held meetings and made phone calls during the year to discuss future needs for each individual plant;
- Selected the best-known options, priced in current-year dollars, and assigned an estimated completion date;
- Submitted a final report to EKPC's Board of Directors for its review and approval.

EKPC has, during the past three years, completed several generation efficiency improvements within its fleet. Included in these improvements were a $1.3 million dollar reheater change out on Cooper Unit 2 and $1.4 million spent at the Spurlock Power Station to upgrade the compressed air system on units 3 and 4. With the air system upgrade, EKPC boosts its ability to operate the recently installed wet flue-gas desulfurization units while reducing the likelihood of a system-wide forced outage.

For the next three years, EKPC estimates spending $1.2 million on advanced steam packing during the overhaul of Unit 2 at the Cooper Station. The packing, taking place at a recognized steam-leak location on General Electric turbines, will decrease the turbine's heat rate and increase its reliability and efficiency.[94]

TRANSMISSION

EKPC owns and operates a 2,967 circuit-mile network of high-voltage transmission designed to deliver power from its generation to the 16 member-owned cooperatives throughout the system. The grid also supports economic/emergency power opportunities to its members, operating at 69, 138, 161, and 345 kV through 68 normally closed interconnections with neighboring utilities. These interconnections enhance reliability, reduce line loss, and minimize the need for transmission expansion.[95]

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[93] *Id.*, p. 140.

[94] *Id.*, p. 24.

[95] *Id.*, p. 3.

In late 2010, EKPC secured 400 MW of firm transmission from Duke Kentucky, Inc. as a member of MISO, for the purpose of importing power into its system, if needed. When Duke Kentucky transferred RTO membership to PJM, EKPC retained the transmission rights through PJM.[96] As of June 1, 2013, as a fully integrated PJM member, EKPC will no longer need to secure the rights to the dedicated 400 MW firm transmission.

EKPC utilizes power-flow analysis, outage data, economic analysis, and the physical condition of its power lines to determine its need to enhance its transmission system. EKPC has not found transmission constraints on its system, winter or summer. It has located and will address specific isolated marginal voltage levels during extreme winter weather, yet it has no thermal limitations.[97]

From 2009-2011, EKPC added:

- Six new transmission interconnections with neighboring utilities (one at 345 kV, three at 138 kV, and two at 69 kV);
- 58 miles of new line, including 35 miles of new 345 kV line;
- Three 138/69 kV substations;
- A new 345/138 kV autotransformer at J. K. Smith Station;
- 48 miles of reconductored or rebuilt existing line using larger (lower impedance, higher capacity) conductor;
- Two 138/69 kV autotransformers to increase capacity;
- Eight new 69 kV capacitor banks totaling 124 MVARs;[98]

EKPC constructed three substations at 69/138kV transmission line intersections, which helped the operating conditions of the system through opening new connection points in the 69kV segment, reducing line loss, and minimizing the need for new transmission lines. Conversely, through reconductoring, EKPC addressed voltage drops in the system, capacity carrying issues, and impedance loss. EKPC notes that reconductoring can increase system capacity by 50 to 225 percent while reducing typical line loss from 250,000 to 400,000 kWh per year.[99]

When EKPC expands its transmission network, its objectives are to meet growing customer demand, improve system efficiency, and enhance reliability. For example, the addition of capacitor banks can help reduce system loss along with

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[96] *Id.*, p. 12.

[97] *Id.*, p. 31.

[98] *Id.*, p. 25.

[99] *Id.*, p. 26.

reducing the need for new transmission lines and/or substations. For the 2012-2014 planning period, EKPC proposes:

- The establishment of two new 69kV transmission interconnections with neighboring utilities;
- Constructing of 36 miles of new 69 kV line;
- Reconductoring/rebuilding 40 miles of existing line using larger (lower impedance, higher capacity) conductor;
- Upgrading one 161/69 kV autotransformer and one 138/69 kV autotransformer to increase capacity;
- The addition of five new transmission capacitor banks totaling 107 MVARs;
- Resizing and/or relocating seven existing 69 kV capacitor banks, totaling 161 MVARs of increased reactive capacity.[100]

EKPC believes that membership in PJM will have insignificant impact on its current transmission plans. PJM focuses on the bulk transmission system – 100 kV and above – while EKPC's present plan involves primarily the 69 kV system and its distribution delivery points. However, as EKPC becomes a full member in PJM, additional bulk transmission projects could be identified on its network.[101]

As a PJM member, EKPC also anticipates minimal effect on interconnections and traffic flows with neighboring utilities, expecting to continue its routine transmission planning and operation. Through economic dispatch of its generating units, PJM will be able to mitigate transmission congestion allowing EKPC opportunities to purchase and sell power in the energy market.[102] With PJM limiting congestion, EKPC assumes it has the necessary transmission for its import and export needs.

DISTRIBUTION

EKPC provides reliable power to its 16 member-owned cooperatives through EKPC-owned substations. The cooperatives take delivery of power at the substation and distribute it among its end-users.

As the substation owner, EKPC works in tandem with the 16 cooperatives to ensure maximum power delivery at the substations. It routinely evaluates the system substation loading and efforts to improve the power factor,[103] thereby enhancing system

[100] *Id.*, p. 27.

[101] Response to Item 4.b of Staff's Second Request, Aug. 20, 2012.

[102] *Id.*, Response to Item 4.d.

[103] The ratio of Real over Apparent Power, where apparent power is the product of the current and voltage and will always be greater than the real power. A low power factor load draws more current, requiring larger conductors and equipment, and increases energy loss.

efficiency and reliability. EKPC performed a system-wide study that identified an optimum design power factor to be achieved at each individual distribution substation transformer. Through power factor correction, EKPC can delay the need for a new substation, or expect better existing substation performance while simultaneously reducing line losses.[104]

However, if the study indicates the need for a new substation by adding substations in the system, EKPC can increase the number of power insertion locations, which also enhances efficiency and reliability. Conversely, if it determines that modifying an existing substation through new transformer upgrades is more cost-effective than constructing another facility, EKPC will purchase and install transformers. From 2009-2011, EKPC:

- Constructed two new 14 MVA distribution substations;
- Constructed three new 20 MVA distribution substations;
- Added a new 14 MVA distribution transformer at an existing station;
- Added a new 20 MVA distribution transformer at an existing station;
- Added a new 25 MVA distribution transformer at an existing station;
- Upgraded three existing distribution substations to 14 MVA;
- Upgraded three existing distribution substations to 25 MVA.[105]

Through system studies, EKPC has determined that there are additional future improvements which will be completed in an effort to meet growing customer demand while improving efficiency and reliability. Distribution-related work planned for the 2012-2015 period includes:

- Construction of a new 7 MVA distribution substations;
- Construction of 36 miles of new 69 kV line;
- Construction of a new 25 MVA distribution substation;
- Addition of three new 20 MVA distribution transformers at existing substations;
- Addition of a new 25 MVA distribution transformer at an existing substation;
- Upgrades of six existing distribution substations to 20 MVA
- Upgrades of two existing distribution substations to 25 MVA

INTERVENOR COMMENTS

The Sierra Club challenges EKPC's IRP as a flawed document that takes an outdated view of available demand-side management, renewable resource, and energy-

[104] Response to Item 6 of Staff's Second Request, Aug. 20, 2012.

[105] 2012 IRP, p. 29.

efficiency opportunities. As such, it asserts that EKPC fails its customers through not offering the least-cost, least-risk, energy opportunities. Particularly, it asserts that:[106]

- EKPC "failed to investigate opportunities and provide encouragement for cogeneration and distributed renewable generation." The Sierra Club states that by reusing the commonly wasted heat generated during an industrial process, industrial users can conserve resources and save money by producing their own electricity. It notes that although EKPC refers to only one cogeneration facility in its territory, there must be favorable conditions for other cogeneration sites, and EKPC should aggressively promote the process. The Sierra Club recommends EKPC play a major role in identifying, developing, and financing these opportunities, and contends that this commitment should also be utilized concerning distributed generation.[107]

- EKPC "failed to address retrofitting versus retiring the Cooper 1 and Dale Plants." The Sierra Club fittingly recognizes that this IRP is filed at a time when the economics concerning fuel choices are changing and environmental regulations are driving the retrofitting of older coal plants with pollution controls. In this IRP, it asserts, EKPC provides little insight regarding the approach it will take concerning these aging units, and a valid resource planning process should supply the answers.[108]

- EKPC "failed to assign a cost to CO_2 over the planning period." The Sierra Club takes the position that EKPC generates a vast amount of its power from coal, a fuel which produces high levels of CO_2, and that failing to acknowledge this and to assign a planning rate for such emissions is not in the best interest of its consumers. At worst, EKPC's planning process should incorporate an industry-acceptable range of prospective CO_2 costs.[109]

- EKPC "ignored sensitivity analysis to evaluate the effects of load growth, emission allowance prices, fuel prices, etc. on its resource planning." The Sierra Club asserts that although EKPC claims its model incorporates multiple-run iterations, the IRP does not contain the detailed data for study. Further, the IRP lacks sensitivity runs regarding energy sales, peak demand, load, natural gas prices, coal prices, natural gas combined-cycle construction costs, CO_2 prices, DSM, renewable energy costs, or energy market prices. Without sensitivity runs, the Sierra Club claims, the IRP provides inadequate information concerning future market variations and by what means EKPC's resource plan would respond to the inherent changes.

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[106] Comments of Sierra Club on the 2012 Integrated Resource Plan of East Kentucky Power Cooperative, Inc. filed Jan. 15, 2013, p. 1.

[107] *Id.*, p. 23.

[108] *Id.*, p. 26.

[109] *Id.*, p. 29.

The Sierra Club further declares that EKPC should do a better job evaluating the customer benefit of bidding-efficiency savings into PJM's May 2013 capacity market auctions. It asserts a couple of direct implications: that EKPC customers will miss out on a revenue stream from PJM, and that EKPC will most likely pay more for capacity by not bidding the energy efficiency into the market, as it could drive the market clearing price for capacity higher.[110]

EKPC RESPONSE TO INTERVENOR COMMENTS

In its responses, EKPC encourages the IRP reader to keep in mind differences among states and to recognize that the Sierra Club compares EKPC's performance and reasonableness to utilities that operate under different regulatory and economic conditions which provide greater incentives for participation. Particularly:

- *As to Cogeneration and Distributed Renewable Generation,* EKPC asserts that its March 31, 2012 cogeneration tariff filing reflected declining energy costs and fixed costs that almost doubled due to proposed increasing air quality compliance costs. This conundrum made the tariffed energy rates returned to the cogeneration facility less attractive, thereby limiting the number of industries willing to invest capital for a reduced payback. It further states that customers lack the expertise necessary to evaluate the cost/benefit relationship linked to reliability and projected savings.[111]

- *As to retrofitting or retiring the Cooper 1 and Dale Plants,* EKPC notes that this IRP filing is a snapshot in time. It rebuts the Sierra Club's position and discusses an ongoing released RFP, in place at the time of the IRP filing, to obtain 300 MWs of generation resources with an online date of October 2015. The Brattle Group is serving as the independent procurement manager for the RFP and will present its evaluation findings to the EKPC Board of Directors. The RFP solicited power purchase agreements and facility ownership of:

  i) New and existing renewable generation;
  ii) Existing Conventional Generation (or a share of a plant);
  iii) New construction of conventional generation, all fuel types, to include turnkey, joint ownership, or other alternatives.[112]

- *As to failing to assign a cost to the CO_2 over the planning period,* EKPC's assessment is that it is not of importance in the IRP. It states that EKPC's current

[110] *Id.*, p. 11.

[111] EKPC's Feb. 12, 2013 Response to Sierra Club's Jan. 15, 2013 Comments, p. 8.

[112] *Id.*, p. 9.

regulatory performance is excellent, CO_2 regulation is speculative, and that the only thing which is certain today is that there are no CO_2 emission laws in effect.[113]

- *As to ignoring sensitivity analysis*, EKPC's IRP addresses uncertainties through mathematical and statistical estimations rather than through a deterministic model. With a deterministic model, mathematical models with outcomes precisely determined through known relationships are utilized. EKPC states that it uses a more sophisticated probabilistic analytic approach. Inputs are modeled with statistical parameters which better estimate the risks entailed with decisions. The model uses load data created specifically from the EKPC load forecast. Five hundred iterations are used in the model simulations.[114]

When the DSM and energy-efficiency programs become cost-effective to bid into the PJM capacity market, EKPC intends to participate. The programs must first reach a participation level and capacity price that exceeds the increased measurement, verification, and other administrative costs incurred to comply with PJM requirements. There are also penalty risks for capacity shortfall due to calculation errors to consider.[115]

DISCUSSION OF REASONABLENESS – RESPONSE TO RECOMMENDATIONS

In the last IRP reviewed in Case No. 2009-00106, Staff recommended that EKPC discuss and provide relevant information regarding cogeneration, net metering, and distributed generation. EKPC provided the information which is summarized in the Cogeneration, Net Metering, and Distributed Generation Section. Staff is reasonably satisfied with the information provided and the EKPC response to the Sierra Club.

EKPC was to examine proposed improvements or better utilization of generation, transmission, and distribution facilities as required by 807 KAR Section 8(2)(a). The information requested included an analysis of summer- and winter-peak transmission constraints. EKPC discussed improvements or better utilization of its generation and transmission systems in the Generation and Transmission Sections in the Efficiency Improvements Section. Staff is generally satisfied with the responses.

Finally, EKPC was asked to provide detailed analysis of the actions taken at each generation station concerning the disposal of coal ash, if more stringent requirements were imposed. EKPC provided the requested information which is summarized in the Compliance Planning Section. Staff is reasonably satisfied with the information provided.

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[113] *Id.*, p. 11.

[114] *Id.*, p. 13.

[115] *Id.*, p. 7.

RECOMMENDATIONS

In the next IRP, EKPC should:

- Discuss and provide analysis with regard to EKPC's 12 percent planning reserve margin and its effects on its capacity expansion plans as they relate to the slightly less than 3 percent reserve margin required by PJM.

- Continue to pursue cost-effective opportunities and provide information concerning cogeneration, renewables, and exploration of stranded gas opportunities.

- Discuss the effect joining PJM has had on the KU/LG&E transmission line contract and the included interconnections.

- Discuss the pending/ongoing plant modifications required to meet EPA or other environmental legislation. Further, EKPC included no CO_2 costs in the supply side evaluation and did not specifically address CO_2 issues in its compliance planning. Although EKPC provided what it believed was appropriate rationale for not doing so, the Staff believes that EKPC should have made some attempt to evaluate the impact of potential CO_2 rules. Staff views the exclusion of CO_2 from the IRP as a shortcoming and therefore recommends that EKPC provide a complete discussion of compliance actions and plans relating to current and pending environmental regulations within the next resource plan.

The Commission expects that environmental compliance planning be performed comprehensively, considering not only existing and pending regulations, but also those reasonably anticipated, including, but not limited to CO_2. On June 25, 2013, President Obama issued his Climate Action Plan and Presidential Memorandum directing the EPA to "...issue proposed carbon pollution standards, regulations, or guidelines, as appropriate, for modified, reconstructed, and *existing* power plants by no later than June 1, 2014 [emphasis added]."[116] Accordingly, comprehensive planning is essential to ensure that proposed compliance measures are implemented and to allow the Commission adequate time to perform its statutory duties in determining that new facilities and modifications are necessary in order to provide safe and adequate service, and that the rates charged are fair, just, and reasonable.

- Summarize, and include in EKPC's next IRP filing, the information in the annual PJM transition reports filed as a result of Case No. 2012-00169 and inform the Commission of its effects on EKPC's reliable production of power.

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[116] Presidential Memorandum of June 25, 2013, Power Sector Carbon Pollution Standards, 78 Fed. Reg. 39535 (2013).

- Report on the ongoing SEPA construction and its effects on EKPC's hydropower.

SECTION 5

INTEGRATION AND PLAN OPTIMIZATION

The final step in the IRP process is to integrate supply-side and demand-side options to achieve the optimal resource plan. This section will discuss the integration process and the resulting EKPC plan.

THE INTEGRATION PROCESS

EKPC uses the RTSim production cost model developed by SimTec, Inc. to analyze possible expansion plans. The RTSim model calculates hour-by-hour operation of the generating system, including unit hourly generation and commitment and power purchases and sales. The model also uses a Monte Carlo simulation to capture statistical variations of unit forced outages and deratings, load uncertainty, market price uncertainty, and fuel price uncertainty.

For the analysis in this IRP the RTSim model used a statistical load methodology based on load data from the EKPC load forecast. A range of distributions created four additional loads around the forecast load to define the high and low ranges of the loads to be examined. Actual and forecasted market prices, natural gas prices, coal prices, and emissions costs are correlated to the load data used. Five hundred iterations were used in the model simulations performed by EKPC.[117]

In its integration process, EKPC developed load forecasts with the impacts of both existing and new DSM programs reflected in the forecast. In winter and summer, the DSM programs resulted in peak demand reductions of more than 200 MW by the end of the 15-year forecast period compared to the forecasted peak demands without the DSM programs included.[118]

RTSim's Resource Optimizer was used by EKPC to perform the optimization of its resource plan. The Resource Optimizer runs the production cost model to perform simulations of a large number of potential resource plans to determine the optimal plan. Future resources to be considered are set up with several potential operation dates. Annualized fixed capital costs and variable costs associated with a particular resource are included in the analyses. Resources included in the analysis included two different peaking, gas-fired technologies; an intermediate/peaking gas-fired technology; two base load, coal-fired technologies; and two unit power purchases of base load capacity.

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[117] 2012 IRP, p. 158.

[118] Technical Appendix, Volume I, pp. 5-6.

PLAN OPTIMIZATION

The Resource Optimizer simulates potential new resources in operation with the system's existing resources in order to determine the optimum expansion plan. In the development of this IRP, EKPC had the Resource Optimizer simulate 2,500 different expansion plans with five iterations of each plan for the 15-year period 2012-2026. Each of the iterations varies inputs such as loads, fuel prices, market prices, and forced outages. The results of the Resource Optimizer runs produced the five lowest-cost plans, which were the plans included in the IRP.[119]

Each of the five lowest-cost plans included some combination of combined-cycle and peaking-power additions, with variations on the timing and size of the additions. In some plans, new peaking CTs would be added, while others included renewable hydro projects and environmental modifications to existing generating capacity, and one plan included an emission-free purchase power agreement.[120] The final plan chosen by EKPC is shown below:

CAPACITY ADDITIONS: 2012-2026

2013[121]	200 MW seasonal purchase[122]
2016	275 MW combined cycle unit[123]
2018	100 MW seasonal purchase
2020	100 MW seasonal purchase
2022	100 MW seasonal purchase
2023	275 MW combined cycle unit

EKPC's total anticipated capacity additions over the 15-year planning period are 550 MW of gas-fired combined-cycle intermediate capacity. As noted in Section 4 of this report, EKPC had issued an RFP prior to filing its IRP for the additional capacity it may need in the event its Dale Station and Cooper Unit 1 generation does not represent the lowest-cost option for it to comply with the MATS rule. The RFP indicated the online date for the addition (if necessary) to be October 2015.

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[119] 2012 IRP, p. 162.

[120] The plans with renewable hydro projects, environmental modifications to existing capacity and the emission-free purchased power agreement were the three highest-cost plans.

[121] The presumed in-service date for additions is the October preceding the year shown.

[122] Seasonal purchases are to continue beyond the year shown until the year the next combined cycle unit is added.

[123] This represents replacement for the Dale Station and Cooper Unit 1 capacity if that capacity is not the least cost compliance option for meeting the requirements of the MATS rule.

DISCUSSION OF REASONABLENESS

EKPC's integration process reflects the recognition of DSM impacts on the need for future capacity additions. It captures the effects of changing environmental rules, as well. EKPC has identified which existing generating facilities are at risk of being retired in the event they are not capable of being retrofitted with the necessary environmental controls in a least-cost compliance strategy.

Commission Staff is generally satisfied with how EKPC has addressed the changes that are being faced by electric utilities in the current environment. The Staff believes that EKPC's overall integration and optimization process is generally thorough and well documented. The Staff concludes that the process is reasonable and has produced reasonable results in this IRP and has no further recommendation for EKPC's next IRP beyond those included in Sections 2, 3, and 4 of this report.