Kentucky Public Service Commission

Staff Report On the

2009 Integrated Resource Plan
Of East Kentucky Power Cooperative, Inc.

Case No. 2009-00106

November 2010

SECTION 1

INTRODUCTION

Integrated resource planning ("IRP") for electric utilities in Kentucky has been mandatory since the 1990 enactment by the Kentucky Public Service Commission ("Commission") of Administrative Regulation 807 KAR 5:058. The IRP regulation established a process that provides for regular review by the Commission Staff ("Commission Staff" or "Staff") of the long-range resource plans of Kentucky's six major jurisdictional electric utilities. The goal of the Commission in establishing the IRP process was to create a comprehensive, but non-adversarial review of demand and supply projections to ensure that all reasonable options for meeting future supply needs were being considered and pursued in a fair and unbiased manner, and that ratepayers will be provided a reliable supply of electricity at the lowest possible cost. The regulation specifies that IRP reviews be conducted by Staff, and that Staff is responsible for issuing a report summarizing its review and recommendations.

East Kentucky Power Cooperative, Inc. ("EKPC") submitted its 2009 IRP to the Commission on April 21, 2009. The IRP includes EKPC's plan for meeting its customers' electricity requirements for the period 2009-2023.

EKPC is a generation and transmission cooperative headquartered in Winchester, Kentucky. It provides all of the power requirements of 16 distribution cooperatives, which provide service in 89 counties located in eastern and central Kentucky. These member cooperatives, Big Sandy RECC, Blue Grass Energy Cooperative, Clark Energy Cooperative, Cumberland Valley Electric, Farmers RECC, Fleming-Mason Energy Cooperative, Grayson RECC, Inter-County Energy Cooperative,

Jackson Energy Cooperative, Licking Valley RECC, Nolin RECC, Owen Electric Cooperative, Salt River Electric Cooperative, Shelby Energy Cooperative, South Kentucky RECC, and Taylor County RECC, serve primarily residential customers, which account for more than 90 percent of their 500,000-plus customers.

EKPC owns and operates three coal-fired generating stations: the Dale, Cooper, and Spurlock stations. EKPC owns and operates nine gas-fired combustion turbines located at its Smith Station site. In addition, EKPC purchases power from the Southeastern Power Administration ("SEPA"). EKPC also owns and operates roughly 15 MW of landfill gas generation. The total capacity available to EKPC, including the SEPA power, is approximately 3,100 MW.

The purpose of this report is to review and evaluate the IRP in accordance with the requirements of 807 KAR 5:058, Section 12(3), which requires the Commission Staff to summarize its review of IRP filings made with the Commission and make suggestions and recommendations to be considered in future IRP filings. The Staff recognizes that resource planning is a dynamic, ongoing process. Thus, this review is designed to offer suggestions and recommendations to EKPC on how to improve its resource plan in the future.

Specifically, the Staff's goals are to ensure that:

1. All resource options are adequately and fairly evaluated;

2. Critical data, assumptions, and methodologies for all aspects of the plan are adequately documented and are reasonable; and

3. The selected plan represents the least-cost, least-risk plan for the end use customers served by EKPC and its member cooperatives.

The report also includes an incremental component, noting any significant changes from EKPC's most recent IRP, which was filed in 2006.[1]

Based on EKPC's 2008 Load Forecast Report, 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.

The remainder of this report is organized as follows:

1. Section 2, Load Forecasting, reviews EKPC's projected load growth and load forecasting methodology;

2. Section 3, Demand-Side Management, summarizes EKPC's evaluation of demand-side management ("DSM") opportunities;

3. Section 4, Supply-Side Resource Assessment, focuses on EKPC's evaluation of supply-side resources options to meet future load requirements; and

4. 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.

[1] Case No. 2006-00471, The 2006 Integrated Resource Plan of East Kentucky Power Cooperative, Inc. (Ky. PSC Oct. 20, 2006).

SECTION 2

LOAD FORECASTING

Introduction

This section reviews EKPC's projected load growth and load forecasting methodology. EKPC prepares energy and peak demand forecasts biennially as required by its primary lender, the United States Department of Agriculture's Rural Development ("RD"). These 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 systems. It obtains much of the data used in developing its forecasts from Global Insight, Inc. ("Global"), a widely used consulting firm with utility industry expertise.

Regional Service Areas

In the service areas of EKPC's member systems, electricity is the primary source for water heating and space heating. Roughly 85 percent of all homes have electric water heating while approximately 60 percent have electric space heating. Average use by residential customers in 2007 was 1,237 kWh per month.

EKPC has combined the service areas of its 16 member systems into seven regions for purposes of forecasting economic activity in its member systems' 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 assumptions contained in the IRP and used in developing the 20-year forecasts for the 16 member systems and EKPC include:

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

2. Residential customers will increase by 165,000, or 1.5 percent annually;

3. Member systems' service areas will experience modest economic growth; regional population will grow at an average annual rate of 0.7 percent; the average unemployment rate over the forecast period will be 5.5 percent;

4. Approximately 75 percent of new households will have electric heat; 85 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 by approximately 4 percent;

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

7. The forecasted load growth is based on normal weather as defined by the National Oceanic and Atmospheric Administration.

For many years, the customer growth of EKPC's members has exceeded regional population growth. This is because the less-developed rural areas served by some of its member cooperatives have experienced greater growth than more urban areas in the seven regions in which its members are located. This trend continues in the current forecast, which shows a 0.7 percent growth rate in regional population, but a 1.5 percent growth rate in residential customers.

Forecasting Methodology

EKPC and its member cooperatives, working together, prepare the individual load forecasts for each cooperative. EKPC then sums the member systems' 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; household income; and weather. The final forecasts reflect analyses of historical data as supplemented by the judgment and experience of the member cooperatives' management and EKPC staff. Both low-case and high-case forecasts are prepared in recognition of the uncertainty attendant to long-term forecasting.

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 provided to EKPC include the following:

1. Employment: per North American Industry Classification System;
2. Unemployment rate;
3. Labor force;
4. Personal income;
5. Wage disbursements, 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 disbursements, total non-farm;

12. Real non-wage income;

13. Real per capita personal 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 member systems' 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.

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 forecast using regression analysis, utilizing typical variables such as electric price, economic activity, and regional population growth.

The number of residential customers is projected using regression analysis. In all seven regions into which EKPC's member systems' service areas are combined, several electric utilities provide service. The portion of the customers in a region served by a given member system 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.

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 price and economic activity.

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

Three relatively small classes 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 buildings and libraries. Only two member systems report such sales. Other sales represent street lighting sales, which is a relatively small class usually forecast as a function of residential sales. Eleven EKPC member systems 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. Small commercial and large commercial / industrial class load factors are applied to energy usage for 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. This method uses detailed information about demographic and economic information, appliance saturation, appliance use, appliance efficiencies, household characteristics, and weather characteristics. The 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 of the other three components.

EKPC's SAE end-use model reflects over 20 years of end-use survey data used to forecast saturation of appliances. 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 the thermal integrity of homes.

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

Residential Sales - Forecast Results

Based on the incremental impacts of existing energy efficiency programs and the expectation that naturally occurring appliance efficiency improvements will decrease retail residential sales by approximately 500,000 MWh, or 4 percent, residential energy sales are forecast to grow at an average annual rate of 2.0 percent. Increasing use per customer is expected to continue due to increasing house size and more appliances in each home. However, this growth is tempered by efficiency improvements in both

appliances and housing construction. Residential sales, which were 6,998,554 MWh in 2007, are projected to grow to 8,059,377 MWh by 2015, 8,899,636 MWh by 2020, and 10,352,048 MWh by 2028, the last year of the forecast period.

Commercial and Other Energy Forecasts

The small commercial customer class consists of commercial and industrial accounts with peak demands less than 1 MW. Those with peak demands equal to or greater than 1 MW are classified as large commercial / industrial. Most commercial customers fall within the small commercial class. Nearly 31,000 small commercial customers were on the EKPC system in 2007. That number is projected to increase to roughly 46,000 by 2028, which reflects an average annual growth rate of 2.1 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 price, and other economic measures as explanatory variables.

Small commercial sales, which were 1,861,952 MWh in 2007, are projected to grow to 2,331,968 MWh by 2015, 2,608,961 MWh by 2020, and 3,064,451 MWh in 2028. Such increases represent an average annual growth rate of 2.4 percent.

There were 121 large commercial / industrial customers on EKPC's system in 2007. The number of large commercial / industrial customers peaked at 138 in 2005 but has since declined due to the weaker economy brought on by the recent economic recession. The number of large commercial / industrial customers is projected to

increase at an average annual rate of approximately 1.7 percent, growing to 168 by the year 2028.

Member systems are in frequent contact with their large commercial / industrial customers. They also communicate 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. One member system serves the largest customer on the EKPC system, which is forecasted individually. That customer, Gallatin Steel ("Gallatin"), is on an interruptible rate and the forecast assumes it will be interrupted during peak periods, up to 360 hours per year. Sales to Gallatin are forecast to be between 966,000 MWh and 970,000 MWh annually over the 20-year forecast period.

Large commercial / industrial sales, which were 2,137,525 MWh in 2007, are projected to grow to 2,748,980 MWh by 2015, 3,025,391 MWh by 2020, and 3,495,898 MWh by 2028, which represents an average annual growth rate of 2.3 percent.

Other energy sales represent seasonal sales, sales to governmental buildings, and street lighting sales. Together, these sales, which account for less than one-half of one percent of retail sales of EKPC member systems, are projected to grow from 49,563 MWh in 2007 to 78,318 MWh in 2028, for an average growth of 2.5 percent.

Total System Energy Forecast

EKPC's 2008 total system energy requirements, including office use by it and its member systems, and transmission and distribution losses, were 12,948,091 MWh. For its system as a whole, EKPC forecasts its total energy requirements to be 15,335,690

MWh in 2015, 16,855,275 MWh in 2020, and 19,447,211 MWh in 2028, the last year of the forecast period, which reflects an average annual growth of 2.0 percent.

Peak Demand Forecasts

There are two peak demand forecasts: one for winter peak demand and one for summer peak demand. Peak forecasting is intended to closely reflect the relationship of weather to peak loads. EKPC is, and has been historically, a winter peaking system.

The data used to forecast seasonal peak demands include:

1. Residential contributions to seasonal peaks are 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 variables reflected in its base case forecast. Those variables include weather, electric price, residential customers, and small and large commercial energy. Adjusting variables

such as these, EKPC developed four alternative forecasts to its base case forecast. Each forecast was assigned a number and is described as follows:

Case 1 – pessimistic economic assumptions with mild weather – lowest loads;

Case 2 – most probable economic assumptions with severe weather – lower loads;

Case 3 – (base) – most probable economic assumptions with normal weather;

Case 4 – most probable economic assumptions with severe weather - higher loads; and

Case 5 – optimistic economic assumptions with severe weather - highest loads.

EKPC's weather-normalized winter peak demand in 2007-2008 was 3,051 MW. Its forecast winter peak demands for 2010-2011 and 2027-2028 under these five cases are as follows:

2010 – 2011	2027 – 2028
Case 1 – 2,853 MW	Case 1 – 3,773 MW
Case 2 – 2,943 MW	Case 2 – 4,082 MW
Case 3 – 3,029 MW	Case 3 – 4,283 MW
Case 4 – 3,421 MW	Case 4 – 4,740 MW
Case 5 – 3,465 MW	Case 5 – 5,115 MW

EKPC's weather-normalized summer peak demand in 2008 was 2,172 MW. Using the same variations in assumptions as for its winter peak demand, it developed summer peak demands in 2010 and 2028 as follows:

2010	2028
Case 1 – 2,142 MW	Case 1 – 2,972 MW
Case 2 – 2,239 MW	Case 2 – 3,119 MW
Case 3 – 2,406 MW	Case 3 – 3,362 MW
Case 4 – 2,536 MW	Case 4 – 3,512 MW
Case 5 – 2,555 MW	Case 5 – 3,726 MW

EKPC also applied these variations in assumptions to its total energy forecast. Compared to its base case (Case 3) forecast of 15,335,690 MWh in 2015 and 19,447,211 MWh in 2028, the low and high case results are as follows:

2015	2028
Case 1 – 12,863,579 MWh	Case 1 – 16,005,923 MWh
Case 2 – 15,088,307 MWh	Case 2 – 19,049,360 MWh
Case 4 – 16,017,515 MWh	Case 4 – 20,217,301 MWh
Case 5 – 16,388,896 MWh	Case 5 – 21,548,597 MWh

Changes from Previous Forecast

EKPC's winter peak demand is expected to increase from 3,051 MW in 2007-2008 to 4,283 MW in 2027-2028, an average annual increase of 1.7 percent. Its summer peak demand is expected to increase from 2,172 MW to 3,362 MW over the same period, an average annual increase of 1.9 percent.

These growth rates are less than those in EKPC's previous (2006) IRP. At that time, its total energy requirements forecast reflected an average annual growth rate of 2.3 percent, compared to the rate of 2.0 percent in its current forecast. Its winter peak demand was projected to grow at a rate of 2.6 percent compared to the 1.7 percent growth rate it now projects. According to EKPC, the lower forecasts are due mainly to lower 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.

Intervenor Comments

Of the parties intervening in the IRP review, only the Environmental Groups 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 result in improper decisions as to its future resource needs. The main points in these comments can be summarized as follows:

1. EKPC has over-estimated its energy needs historically and it continues to do so in this IRP;

2. EKPC's forecast is based on outdated data, reflecting that its IRP was filed seven months after the forecast was prepared;

3. EKPC's forecast is very likely wrong and wrong for 2009, the first year of the forecast;

4. EKPC's forecast fails to consider mandatory improvements in efficiency of various appliances; and

5. EKPC's analysis of one of its largest customers is based on guess work.

EKPC Reply Comments

In response to the Environmental Groups comments, EKPC stated that, when its historical energy requirements are compared to the past load forecast appropriate for comparison to that time period, it had "[a]ctually underforecasted" its load requirements in seven of the last 15 years. While acknowledging that its forecast was prepared in August 2008, EKPC stated that 1) the forecast was prepared and approved per RD's requirements that it prepare a new forecast every two years; 2) the forecast has been reviewed and is still in line with the economic projections developed by Global for use in the forecast; 3) the forecast remains viable after taking into account the mild weather in 2009; 4) mandatory appliance efficiency improvements were reflected in its residential energy forecast; 5) an adjustment was made to the 2009 and 2010 forecasts for Gallatin, whose production was down in 2008; and 6) adjustments were made for future demand-side impacts which were over 200 MW during the forecast period.

Discussion of Comments / Discussion of Reasonableness

Staff's observations regarding the comments and reply comments are as follows:

Since the Commission's IRP regulation was promulgated in 1990, EKPC has filed seven IRPs. When its actual sales are compared to its past forecasts, in some instances it under-estimated its future sales and in some instances it over-estimated its future sales. There has been no consistent over-estimation of its sales. While the areas served by its member systems have experienced the highest growth rate of the six utilities which file IRPs with the Commission pursuant to 807 KAR 5:058, the "accuracy" of EKPC's prior forecasts has been similar to that of the other five utilities.

That EKPC's forecast was prepared in August 2008 and its IRP was filed in April 2009 does not diminish or detract from the viability of the forecast. While the age of a forecast can be a factor in some instances, the relevance of the data upon which it is based and the reasonableness of the assumptions used in the forecast are typically much more critical than its age. The forecast being seven months old at the time the IRP was filed, in and of itself, does not invalidate EKPC's analysis.

The Environmental Groups' reference to EKPC's forecast being "wrong" in 2009 reflects a lack of understanding of 1) the manner in which forecasts are prepared for inclusion in a utility's IRP, 2) the nature of forecast assumptions in developing long-term forecasts, and 3) the factors that can impact electric sales on a year-to-year basis.

The forecasts included in a utility's IRP are, by definition, long-term in nature. This means that they are prepared based on normal weather / average temperatures being experienced over the term of the forecast. It also means that factors such as customer growth, employment, income, and other economic variables are reflective of the long-term, not the expectations for a single year. By their very nature, forecasts will not be exact predictors of actual results on an annual basis due to variances in weather and temperatures. Neither will all near-term developments in economic conditions be captured in a given year of a long-term forecast—whether positive or negative.

By published accounts, both heating and cooling degree days in 2009 were less than normal for much of Kentucky. Cooling degree days in particular were less than normal, ranging from between 10 and 15 percent below the 30-year averages published by NOAA for the numerous metering points it measures across the Commonwealth. That being the case, and with there being little improvement in the state's economy

during this past calendar year, it's not surprising that EKPC's 2009 sales fell short of its forecast. However, none of the criticisms offered by the Environmental Groups' leads Staff to conclude that this result in any way invalidates EKPC's forecast.

EKPC's reply comments, together with its data responses, indicate that, contrary to the Environmental Groups' assertions, it did account for mandatory improvements in efficiency for appliances in its residential energy forecast. It did reflect these improvements in its demand forecasts and it provided explanations for how it reflects, or, why it did not reflect such improvements in the forecasts of its commercial and industrial customer classes.

Finally, the Environmental Groups' criticism of how EKPC treats the load of Gallatin for forecasting purposes calls for using a "macro" approach, while ignoring the "micro" approach that EKPC and Gallatin's retail electric supplier, Owen Electric, have been using for many years. Staff sees no validity in this criticism.

In general, Staff is satisfied with EKPC's energy and demand forecasts. Its current forecasting methodology is consistent with the methodology it has used in its previous IRPs and provides a thorough and well-reasoned overall approach to forecasting its long-term resource needs.

Recommendations

For its next IRP, Staff makes the following recommendations concerning EKPC's energy and demand forecasts:

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

2. 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 carbon dioxide (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

3. 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.

SECTION 3

DEMAND-SIDE MANAGEMENT

Introduction

This section discusses the DSM component of this IRP. EKPC identified seven improvements in its DSM planning since its 2006 IRP. They were identified as follows:

1. A more comprehensive set of DSM measures was evaluated based upon (1) Staff's recommendations contained in its report on EKPC's 2006 IRP, (2) feedback from the Attorney General ("AG"), the Kentucky Division of Energy, and other state agencies, Kentuckians for the Commonwealth, the Kentucky Environmental Foundation, and the Sierra Club, (3) DSM programs of other Kentucky utilities, and (4) DSM best practices by electric utilities nationwide;

2. An increased environmental avoided cost adder for the societal test;

3. Updated avoided costs for capacity to match current plans for transmission, distribution, and generation investment;

4. Reflecting load impacts of changes in federal appliance efficiency standards;

5. Accounting for the state tax incentives included in 2008 legislation;

6. Sensitivity testing to examine the impact of changes in assumptions on impact levels and cost-effectiveness; and

7. Enhanced program designs reflecting lessons learned in the field and best practices in the electric industry.

Existing Programs

EKPC identified 11 DSM programs which it and its member cooperatives offer to the member coops' retail customers. The IRP contained an evaluation of the existing DSM programs offered by EKPC and its member cooperatives, which are as follows:

1. Electric Thermal Storage;
2. Electric Water Heater;
3. Geothermal Heating & Cooling;
4. Air-Source Heat Pump;
5. Tune-Up HVAC Maintenance;
6. Button-Up Weatherization;
7. Touchstone Energy ("TSE") Home;
8. TSE Manufactured Home;
9. Compact Fluorescent Lighting;
10. Interruptible Load – Gallatin; and
11. Interruptible Load – Other.

The IRP includes load impacts, program descriptions, and discussion of target markets and tables for EKPC's existing DSM programs.

The IRP includes benefit/cost analyses of EKPC's existing DSM programs using the traditional "California Tests."[2] For three programs, Electric Water Heater Retrofit, Air-Source Heat Pump New Construction, and Air-Source Heat Pump Retrofit, the results of the Total Resource Cost ("TRC") test were less than 1.0, meaning that costs

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

exceeded benefits. When questioned about these results and its future plans for these programs, EKPC stated that these are all mature programs offered by its members and that it and its cooperatives were aware of the programs' eroding benefit/cost ratios. It also described the factors that had contributed to this erosion and indicated that it and its members were carefully examining the best course of action to pursue given these test results. EKPC projects future demand reductions of 186.7 MW to its winter peak and 145.4 MW to its summer peak due to its existing DSM programs.

Program Descriptions

Following is a brief description of each of EKPC's existing DSM programs:

1. Electric Thermal Storage – a rate discount is offered for off-peak electricity purchased for space heating uses;

2. Electric Water Heater – rebates are offered for residential retail members to install high efficiency electric water heaters;

3. Geothermal Cooling and Heating – rebates are offered to retail members who install efficient geothermal heating cooling and heating systems;

4. Air Source Heat Pump – rebates are offered to residential retail customers to install a high efficiency air source pump;

5. Tune-Up HVAC Maintenance – rebates are offered to retail customers with duct systems that are at least two years old to have a six-point maintenance program performed by certified contractors;

6. Button-Up Weatherization – installation of insulation materials in homes that are at least two years old and use electricity as the primary source of heating;

7. Touchstone Energy Home – rebates are offered to residential customers who build all-electric homes to Energy Star® standards;

8. Touchstone Energy Manufactured Home – rebates are offered to customers to purchase all-electric manufactured homes built to Energy Star® standards;

9. Compact Fluorescent Lighting – compact fluorescent bulbs are provided to retail members at each member cooperative's annual members meeting;

10. Interruptible Load – Gallatin – under a special contract, EKPC provides demand credits to Gallatin Steel in return for the right to interrupt on either a ten minute or 90 minute notice; and

11. Interruptible Load – Other – under individualized special contracts, large commercial and industrial customers receive demand credits, or discounts, in return for being subject to interruption and having their load reduced to a pre-determined firm level.

New DSM Programs

Aside from its 11 existing programs, EKPC evaluated 103 DSM measures which were considered as possible resource options. The 103 measures were developed after EKPC's review of (1) Staff's recommendations contained in its report on EKPC's 2006 IRP, (2) feedback from the Attorney General ("AG"), the Kentucky Division of Energy, and other state agencies, (3) feedback from groups such as the Kentucky Environmental Foundation, Kentuckians for the Commonwealth, and the Sierra Club, (4) the DSM programs of other Kentucky utilities, and (5) DSM best practices by electric utilities nationwide.

EKPC's DSM analysis consists of two steps to evaluate DSM resources for possible inclusion as new DSM programs in its IRP. Step one, qualitative screening, is an assessment of a large group of DSM measures, which covers all customer classes. These measures include a robust group of technologies and strategies for producing energy and capacity savings. In the qualitative screening each measure is evaluated under four criteria: (1) customer acceptance; (2) measure applicability; (3) savings potential; and (4) cost effectiveness. EKPC evaluated 103 DSM measures in its qualitative screening process, 46 residential measures, and 57 commercial or industrial measures. Those measures which scored 15 or higher out of a possible score of 20 under the four criteria were passed on to the more rigorous second step of the analysis, quantitative evaluation.

Thirty-three DSM measures (15 residential and 18 commercial/industrial) passed the qualitative screening process to be considered for further analysis. Some measures were combined into programs and some programs did not lend themselves to quantitative analysis. This resulted in 25 programs being considered in EKPC's quantitative evaluation. EKPC utilized DSManager, a software package created by the Electric Power Research Institute ("EPRI"), an electric industry research group, to compute the benefit/cost ratios for the 25 programs in its quantitative evaluation. DSManager determines the cost-effectiveness of DSM programs by reporting results using the "California Tests." EKPC evaluated the programs under the Participant Cost Test, the Ratepayer Impact Measure, and the Total Resource Cost ("TRC") Test. A fourth perspective, the Societal Test ("SC"), is treated as a variation on the TRC Test. Relying primarily on the TRC results, the evaluation produced 23 programs with benefit-

cost ratios greater than 1.0. The 23 programs were all considered in the integrated analysis portion of the IRP by EKPC.

Program Descriptions

Following is a brief description of each of EKPC's new DSM programs:

1. Direct Load Control of Air Conditioners and Water Heaters – bill credits would be offered to retail customers who permit their air conditioning and heat pump units to be cycled on and off or permit their water heater loads to be curtailed;

2. Residential Efficient Lighting – EKPC would sponsor aggressive marketing and promotion of compact fluorescent bulbs. It would underwrite certain discounts for bulbs sold to customers of its member cooperatives;

3. Energy Star Clothes Washer – rebates would be offered to residential retail members as an incentive to purchase high efficiency washers that meet Energy Star standards;

4. Energy Star Room Air Conditioner – rebates would be offered to residential retail members to purchase Energy Star qualified room air conditioners;

5. Energy Star Refrigerator – rebates would be offered to residential retail customers to purchase Energy Star qualified refrigerators;

6. Programmable Thermostat w/ Electric Furnace Retrofit – rebates would be offered to residential retail members to install programmable thermostats;

7. Enhanced Touchstone Energy Home – this program, if implemented, would replace the existing TSE Home program. It would offer rebates to customers building new homes to Energy Star standards and include enhancements such as thermal sealing/thermal bypass and R-38 attic insulation;

8. Furnace Replacement w/ Heat Pump – rebates would be offered to retail members to install a high efficiency heat pump instead of resistance heat upon the failure of the existing heating and/or central air conditioning system;

9. Low Income Weatherization -- EKPC would pay for weatherization energy efficiency measures to be installed in the homes of existing residential low income customers;

10. Home Performance w/ Energy Star Program – this would combine the existing Tune-Up and Button-Up programs into a single comprehensive program with an advanced set of measures for improving energy efficiency;

11. Mobile Home Retrofit Program -- various insulation, weather sealing, and energy efficiency measures would be offered to make the existing mobile homes of residential retail customers more energy efficient;

12. Energy Star Central Air Conditioners – rebates would be offered to retail customers to purchase Energy Star qualified central air conditioners;

13. Direct Load Control of Residential Pool Pumps – bill credits would be offered to retail customers who permit pool pumps to be cycled on and off;

14. Commercial & Industrial Demand Response – incentives of $25 per kW of demand would be offered to large customers to reduce their demands on short notice for short periods of time in response to conditions on EKPC's system or the electric grid in general;

15. Commercial Efficient HVAC Program – incentives would be provided to customers for unitary commercial air conditioners and heat pumps that exceed the 2006 Federal energy efficiency guidelines;

16. Commercial Building Performance Program – would offer tuning, and operation and maintenance services for HVAC and other equipment in existing buildings;

17. Commercial New Construction Program – would promote installation of energy efficiency measures in new commercial construction;

18. Commercial Efficient Refrigeration Program – would promote installation of high efficiency refrigeration equipment in existing commercial facilities that use refrigeration equipment;

19. Commercial Direct Load Control of Air Conditioning – would offer bill credits to retail customers who permit their air conditioning and heat pump units to be cycled on and off or to reduce demand according to predetermined control strategy;

20. Commercial Advance Lighting – would offer incentives to customers to install high efficiency lamps and ballasts in facilities and lighting systems that are at least two years old;

21. Industrial Premium Motors Program – would offer incentives to customers to upgrade in-service motor stock to premium efficiency motors. Premium efficiency motors exceed Federal Standards or the National Electrical Manufacturers Association premium efficiency ratings;

22. Industrial Variable Speed Drives Program – would promote variable speed drives and drive systems to improve motor efficiency at facilities which have been in service for at least two years; and

23. Industrial Compressed Air Program – would offer a comprehensive approach to efficient production and delivery of compressed air in industrial facilities,

including: training of staff; detailed assessment of facilities' compressed air systems; and incentives for capital-intensive improvements.

EKPC explicitly factored environmental costs into its DSM evaluation based on the three major categories of such costs: (1) the cost of allowances which were reflected in marginal energy costs; (2) capital costs of control equipment at power plants, which were reflected in marginal capacity costs: and (3) externalities, which were reflected in an adder of $40 per ton in the SC analysis. The $40 per ton adder was based on estimates of what future allowance prices could be in a market with a cap and trade program for carbon.

Comments of the Environmental Groups

The Environmental Groups claim that EKPC's consideration of DSM is "less aggressive than is reasonable but on the right track." They claim, based on a report prepared for them entitled A Portfolio of Energy Efficiency and Renewable Energy Options for East Kentucky Power Cooperative, that EKPC could achieve 63 percent greater energy savings through DSM than the level of savings projected in the IRP. They contend that EKPC should perform quantitative analyses of all 103 measures for which it performed qualitative analyses, claiming that some of the measures rejected through the qualitative screening process would be cost-effective if implemented. The Environmental Groups opine that, once EKPC "comes up with a comprehensive DSM plan .... EKPC must also come up with an effective plan to implement it." They argue that a utility needs one employee dedicated to DSM for every 5,000 customers it has in order to effectively administer DSM programs. In addition, the Environmental Groups criticize EKPC for not having applied for a DSM surcharge and state that if EKPC does

not pursue a surcharge it must "come up with an alternative funding mechanism."

EKPC Reply Comments

EKPC states that, in both its IRP and in data responses, it explained how DSM cost-benefit analyses are performed. EKPC claims that the report the Environmental Groups rely upon when they contend that it significantly underestimates the potential energy savings from DSM contains "several errors which grossly overestimated the potential savings from DSM." EKPC states that the 103 measures identified in its IRP "were evaluated qualitatively by experts at the member systems and EKPC." Based on the combined results of the four criteria of (1) Customer Acceptance, (2) Measure Applicability, (3) Savings Potential, and (4) Cost-Effectiveness, used in the qualitative analysis, EKPC determined that 25 of the 103 measures should be taken through the quantitative analysis.

EKPC states that its analysis of DSM programs is reasonable and ongoing. Its IRP represents a snapshot of DSM programs evaluated at the time it was filed. It goes on to state that other programs have been evaluated since the filing of its IRP and that it will continue to evaluate programs in the future.

Discussion of Reasonableness – Response to 2006 Recommendations

Staff made four specific recommendations concerning DSM in its report on EKPC's 2006 IRP. Those recommendations were:

1. Continue to evaluate and pursue DSM opportunities to the same extent and scope as reflected in this, EKPC's 2006 IRP;

2. Consider DSM as an environmental compliance option in addition to a resource option or, at minimum, explain why it has not done so;

3. Based on federal actions at the time, EKPC should include explicit discussion in its next IRP of its plans for managing carbon emissions; and

4. Based on the extent to which "new" DSM programs are being implemented, reflect their estimated load impacts in EKPC's load forecast or, in the alternative, in the sensitivity analysis of its load forecast.

The IRP reflects that EKPC continues to evaluate and pursue DSM opportunities on a scale consistent with what was exhibited in its prior IRP. Of those programs identified as "new" programs, EKPC has already implemented the Direct Load Control of Air Conditioners and Water Heaters Program. Staff is unaware of any other "new" programs being implemented and, particularly considering EKPC's capacity deficit, we strongly encourage it and its member cooperatives to aggressively pursue implementing new DSM programs.

EKPC has factored environmental costs into its DSM evaluation process by reflecting the costs of allowances, capital costs for environmental control equipment, and externalities based on estimated carbon allowance prices under a federal cap and trade program.

While no federal regulation of carbon emissions was in place at the time it filed its IRP, given the potential that some form of federal carbon regulation will be implemented in the future, EKPC imputed the aforementioned $40 per ton cost adder based on the legislation contained in the Bingaman and Lieberman-Warner bills which were introduced in Congress in 2008.

The Direct Load Control of Air Conditioners and Water Heaters Program was the only "new" program EKPC was in the process of implementing at the time it was

preparing its IRP. EKPC treated it as a new program and reflected its impacts in its load forecast sensitivity analysis.

Discussion of Reasonableness – Intervenor Comments and EKPC Reply Comments

Staff disagrees that EKPC's consideration of DSM is "less aggressive than is reasonable" as the Environmental Groups contend. We are encouraged by the breadth and scope of EKPC's DSM analysis. However, we do believe EKPC should attempt to take a more aggressive approach in moving new programs, once they've passed the quantitative analysis, from the analysis phase to implementation.

Staff is aware, from its review of numerous IRPs, that employing a qualitative screening process as the first step in the analysis of DSM measures, is the typical approach used in the electric utility industry. Accordingly, we find no fault with EKPC using this approach in a process which, by definition, is subjective in nature. However, that very subjectivity leads Staff to believe that some measures that fail to achieve a score of 15 on a scale of 20 in the qualitative analysis should be carried forward to the quantitative analysis. For example, rather than adhere strictly to the cut-off of 15, EKPC could include measures which score 14 or better overall and 4 or better in savings potential and cost-effectiveness in the quantitative analysis.

Recommendations

In recognition of EKPC's projection of a substantial capacity deficiency, EKPC should aggressively pursue new DSM opportunities and implement new DSM programs that are reasonable and cost-effective.

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 in addition to 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 included in the Staff's report on EKPC's 2006 IRP.)

SECTION 4

SUPPLY-SIDE RESOURCE ASSESSMENT

Introduction

This section summarizes, reviews, and comments 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 owns and operates 1,933 MW of coal-fired, base load capacity at three sites, consisting of 10 generating units. EKPC owns 1,036 MW of duel-fueled, gas and oil combustion turbines ("CTs"). The existing coal-fired, base load generation reflects EKPC's newest generating unit, the 278 MW Spurlock Station Unit 4 ("Spurlock 4"), which began commercial operation in April 2009. The CTs include two new 97 MW CTs at the Smith Generating Station that became operational in December 2009. EKPC also owns and operates 16.8 MW of landfill gas generating capacity at several sites in central and eastern Kentucky. EKPC's existing capacity is shown in Table 1:

TABLE 1 – EXISTING CAPACITY

Plant Name	Unit Number	Net Capacity (MW)	Facility Type	Fuel Type
Dale Station	1	23	Steam	Coal
	2	23	Steam	Coal
	3	75	Steam	Coal
	4	75	Steam	Coal
Cooper Station	1	116	Steam	Coal
	2	225	Steam	Coal
Spurlock Station	1	325	Steam	Coal
	2	525	Steam	Coal
	Gilbert	268	Steam	Coal
	4	278	Steam	Coal
Smith Station	1	150	CT	Gas/Oil

	2	150	CT	Gas/Oil
	3	150	CT	Gas/Oil
	4	98	CT	Gas/Oil
	5	98	CT	Gas/Oil
	6	98	CT	Gas/Oil
	7	98	CT	Gas/Oil
	8	97	CT	Gas/Oil
	9	97	CT	Gas/Oil
Landfill Gas Plant		16.8	Landfill Gas Plant	
TOTAL		**2,985.8**		

In addition to the existing capacity shown in Table 1, EKPC has received Commission approval to construct a 278 MW Circulating Fluidized Bed ("CFB") unit at the Smith Station in Clark County. However, a certificate for the construction of approximately 270 MW of additional peaking capacity at the Smith Station has been rescinded since the time of EKPC's previous IRP (2006).[3]

EKPC has up to 170 MW of hydropower available on a long-term basis through a purchased power contract with SEPA. The 70 MW at Laurel Dam has continued to be reliable capacity. However, due to various dam repair projects, the l00 MW provided from the Cumberland System has not been dependable capacity during the past two years and is not expected to be considered dependable for another three to four years. Once the dam repairs are completed, the capacity should return to firm dependable status for the long term.

EKPC also has a contract with Duke Energy Ohio to purchase the output of the Greenup Hydro facility through 2010. Greenup Hydro is run-of-river generation located on the Ohio River with an average winter capacity of 35 MW. EKPC's projected

[3] Case No. 2006-00564, An Investigation into East Kentucky Power Cooperative, Inc.'s Continued Need for Certificated Generation (Ky. PSC May 11, 2007).

capacity needs (winter in the left-hand column / summer in the right-hand column) for 2009 through 2023 are shown in Table 2:

TABLE 2 – PROJECTED CAPACITY NEEDS (MW)

Year	Projected Peaks		12 Percent Reserves		Total Requirements		Existing Resources		Capacity Needs	
	Win	Sum	Win	Sum	Win	Sum	Win	Sum	Win	Sum
2009	2,942	2,344	353	281	3,295	2,625	3,130	2,409	165	216
2010	2,983	2,353	358	282	3,341	2,635	2,720	2,509	621	126
2011	3,017	2,375	362	285	3,379	2,660	2,685	2,469	694	191
2012	3,056	2,424	367	291	3,423	2,715	2,675	2,459	748	256
2013	3,107	2,480	373	298	3,480	2,778	2,675	2,459	805	319
2014	3,153	2,520	378	302	3,531	2,822	2,675	2,459	856	363
2015	3,208	2,564	385	308	3,593	2,872	2,675	2,459	918	413
2016	3,260	2,611	391	313	3,651	2,924	2,675	2,459	976	465
2017	3,323	2,663	399	320	3,722	2,983	2,675	2,459	1,047	524
2018	3,377	2,713	405	326	3,782	2,039	2,675	2,459	1,107	580
2019	3,446	2,769	414	332	3,860	3,101	2,675	2,459	1,185	642
2020	3,509	2,821	421	339	3,930	3,160	2,675	2,459	1,255	701
2021	3,593	2,891	431	347	4,024	3,238	2,675	2,459	1,349	779
2022	3,670	2,955	440	355	4,110	3,310	2,675	2,459	1,435	851
2023	3,746	3,014	449	362	4,194	3,376	2,675	2,459	1,519	917

Reliability Criteria

A reserve margin is the amount of capacity in excess of that required to meet the projected peak load. A reserve margin is necessary in order to reduce the risks that are posed by forced outages, transmission constraints, load forecast deviations, or other unforeseen events that can prevent a utility from being able to meet its load requirements.

EKPC has been using a 12 percent reserve margin since prior to the filing of its 2003 IRP. EKPC's previous studies indicate this reserve level provides appropriate

reliability.[4] In preparing its 2006 IRP, EKPC performed an analysis to determine the reasonableness of using a 12 percent reserve margin. The analysis indicated that EKPC could reduce its reserve margin to 10 percent. EKPC, however, chose to continue using a 12 percent reserve margin to ensure reliability.[5]

For EKPC's 2009 IRP, RTSim's Resource Optimizer ("Optimizer")[6] was used to perform the optimization of the resource plan. From this model five plans were identified and reviewed to determine if the operation dates of the near term resources were achievable. These resources were used to build up to a 12 percent reserve margin.

Supply-Side Resources

EKPC's existing capacity consists of base load coal-fired units and peaking units (SEPA hydro and combustion turbines). EKPC utilizes various resources in the Resource Planning Process. Detailed cost information is developed from sources such as industry expert consultants, ACES Power Marketing, EVA fuel and emissions forecasts, specialized databases such as Global Energy, as well as specific research done on market websites such as NYMEX, Evolution Markets, EIA, Chicago Climate

[4] Application, Section 8. Resource Assessment and Acquisition Plan, at 8-60.

[5] Case No. 2006-00471, The 2006 Integrated Resource Plan of East Kentucky Power Cooperative, Inc., Application, Section 8, Resource Assessment and Acquisition Plan, at 8.(5)(d) EKPC Reserve Margin Analysis, 8-65 to 8.67.

[6] The RTSim Resource Optimizer is a module included in EKPC's production cost model that incorporates risk analysis, optimization, and detailed production cost simulation to determine the lowest cost plans while simultaneously mitigating risk. A detailed discussion of Optimizer is included at Section 8(5)(a) Supply-Side Optimization and Modeling, 8-52 to 8-55.

Exchange, and others. Cost information is also based on current projects and budget estimates.[7]

EKPC hired Navigant Consulting to review input assumptions for this study. The RTSim model is used for detailed production costing and emission estimating studies. This program simulates system operation on an hourly chronological basis.[8]

RTSim's Resource Optimizer also was used to produce optimal expansion plans. The optimizer evaluated a variety of resource options, start-up dates, and market and load conditions to produce the lowest cost plans. Supply-side capacity alternatives considered in the 2009 IRP are listed below:

1. Combustion turbines (Peaking);
2. Combine Cycle (Intermediate);
3. Coal-Fired Units (Base Load);
4. Various Term Purchases; and
5. Renewable Generation,[9] (including wind, solar, and biomass).[10]

In general, the construction cost for peaking units is the least, with intermediate capacity and base load capacity costing progressively more. The reverse is true, however, for variable costs, with base load capacity having the lowest variable

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[7] Application, Section 5(2), Supply-Side Resources, at 5-12.

[8] Id.

[9] Id.

[10] Id., at 5-7.

production costs. Renewable generation tends to have significantly higher capital costs than traditional generating units, but it also has more environmental benefits.[11]

Optimizer constructs expansion plans to meet certain criteria, then simulates each plan and calculates the present value of each plan as compared to doing nothing to determine the lowest cost plans. In development of the 2009 IRP, Optimizer was set to try up to 2,500 unique expansion plans, each with five iterations which varied loads, fuel and market prices, and forced outages. EKPC provided a summary of the five lowest cost plans, which were then reviewed to determine if the operation dates of the near term resources were achievable. Resources were placed in EKPC's expansion plan spreadsheet based on these plans in order to build up to EKPC's 12 percent reserve margin. Some shifting of units was made to allow some flexibility in the reserve margin and to eliminate or defer higher cost gas-fired units.[12]

EKPC also considered retirement and repowering options. Based on its analysis, EKPC does not plan to retire or re-power any of its 10 existing coal-fired units during the 15-year planning horizon, through 2023.[13] EKPC's 2009 IRP has identified the need for 808 MW of additional base load capacity after 2010 through 2023. The 278 MW Smith 1 CFB projected to be added in 2014 is already committed. EKPC projects that through purchase power agreements, it will add 30 MW of biomass generation in 2017 and 200 MW of emission free generation in 2021.[14] The 300 MW of generation identified for

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[11] Id.

[12] Application, Section 8(5)(a), at 8-52 to 8-53.

[13] Application, Section 8(2)(a), at 8-3.

[14] Id., Section 8 (4)(a), at 8-49.

addition in 2023 has not been identified. Additionally, 350 MW of peaking capacity will be needed from 2011 through 2023. Although not specifically identified, it appears that EKPC will meet this peaking need with combustion turbines.

EKPC stated that it has an on-going planning process, that this IRP represents only one snapshot in time of that process, and that changing conditions may warrant changes to this IRP.[15] Table 3 shows EKPC's projected major expected capacity additions that are needed from 2009 through 2023.

TABLE 3 – PROJECTED MAJOR CAPACITY ADDITIONS (MW)

Year	Base load Capacity	Peaking/Intermediate Capacity
	(MW)	**(MW)**
2009		
2010	278 (Spurlock 4) 2 Landfill Gas	200 LMS 200 Seas Purch
2011		
2012		100
2013		
2014	278 (Smith 1 CFB)	
2015		50
2016		
2017	30	
2018		
2019		100
2020		100
2021	200	
2022		
2023	300	

[15] Id., at 5-2.

Supercritical pulverized coal units, hydropower, wind power, and landfill gas projects were not included in the optimization model. According to EKPC, supercritical pulverized coal units, typically 750 MW units, are too large for the EKPC system without a partnership with one or more other entities to obtain the benefit of such a unit. EKPC is not opposed to such an arrangement and has evaluated such proposals in the past. However, EKPC was not aware of a partnering opportunity and did not evaluate a supercritical pulverized coal unit in this IRP. EKPC stated that once it determines that it needs to begin the procurement process for its next baseload supply source, it will then issue a Request for Proposal ("RFP") to solicit proposals for power which would include developers of any supercritical pulverized coal units.

EKPC also stated that it was not aware of any viable hydro projects that are available to be developed or from which to purchase. EKPC currently purchases the output of Duke Energy's Greenup Hydro unit and some of the output from SEPA hydro projects. EKPC stated that it has evaluated available hydropower projects in past IRPs and would consider such projects in the future when output is available.

EKPC evaluated wind power as part of its evaluation of the proposals received in response to the renewable power RFP issued in April 2008. EKPC continues to evaluate the proposals and no determination has been made regarding wind power at this time. EKPC has determined from its renewables analysis that wind is not an economic resource option absent new legislation or environmental rules requiring the use of renewables. EKPC stated that it will update its analysis if such requirements materialize.

Landfill gas projects are very site-specific and tend to be small (1.5 MW to 3.5 MW). According to EKPC, such projects are difficult to evaluate when considering 3,000 MW of total system capacity. EKPC has six landfill gas projects on-line that provide approximately 16.8 MW of capacity. EKPC states that it will continue to actively pursue additional landfill gas projects.[16]

Assessment of Non-Utility Generation - Cogeneration, Renewables, and Other Sources

Cogeneration

EKPC did not provide any specific discussion of cogeneration.

Renewables

In April 2008, EKPC issued an RFP for renewable energy resources with the intent to determine availability of renewable energy in and around the Commonwealth. The RFP did not include any limit on the type of generation or the amount of energy but did specify wind, solar, biomass, hydro, geothermal, and recycled energy as the possible forms of generation. Thirty-six entities submitted a Notice of Intent ("NOI") to respond to the RFP. EKPC actually received 22 bids that offered approximately 2,200 MW of solar, wind, hydro, biomass, waste heat, or municipal solid waste. EKPC selected 12 responses representing over 900 MWs for further review.

A listing of the type of offers received is shown below:

Type of Offer	**Number**
Biodiesel	1
Biomass	4
Hydropower	1
Municipal Solid Waste	2
Solar	5

[16] EKPC's Response to Staff's Second Data Request, Item No. 15.

Waste Heat	1
Wind	8 (1 in Kentucky)

Including the one wind project, 14 of the 22 offers included projects located in Kentucky.[17]

At the time of filing of the IRP and during the discovery process, EKPC was still in negotiations with those entities submitting proposals[18] and no specific projects had been selected for final development. EKPC did state that several fuel supply studies and potential partnerships are being developed.

As part of its consideration of the renewable proposals, EKPC indicated that it would continue working with viable offers and would continue looking for alternatives. EKPC indicated that it would work with wood fuel suppliers to determine the potential for biomass generation at Cooper Station and Spurlock Station. EKPC is trying to set up a test burn at Cooper Station. EKPC also is considering entering into a site study with a wind developer in Kentucky. EKPC expects some bidders to approach it once projects are more fully developed. Finally, EKPC indicated that it will continue working with the National Renewables Cooperative Organization ("NRCO"), a group of which it is a board member.[19]

Even though no specific renewable project was selected, EKPC did include the addition of a 30 MW biomass Purchase Power Agreement ("PPA") scheduled for 2017 in its final resource plan (shown in Table 3). In addition, EKPC states that the

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[17] Application Section 8(2)(c), at 8-12 to 8-14.

[18] EKPC's Response to the First Data request of the Public Interest Groups, Item No. 74.

[19] Application Section 8(2)(c), at 8-12 to 8-14.

renewable generation and cost characteristics from the proposals provided information for its resource optimization modeling.[20]

Other Non-utility Sources

Other than what is included in the discussion regarding renewables, EKPC did not specifically discuss non-utility generation. EKPC stated that it will continue to consider non-utility generation on a case by case basis or as part of an RFP process.[21]

Compliance Planning

EKPC states that the main environmental issues that it is facing for the next 15 years are permitting and installing pollution control devices to control sulfur dioxide ("SO_2"), nitrogen oxide ("NOx"), and particulate matter emissions ("PM") to ensure compliance. In the meantime, the Kentucky Division for Air Quality will be issuing new mercury regulations to all Kentucky utilities in the near future.

EKPC is in compliance with the Clean Air Act amendments of 1990, as well as subsequent environmental legislation such as the Clean Air Interstate Rule ("CAIR") and the Clean Air Mercury Rule ("CAMR'). CAIR was issued in 2005 and set new annual reductions of SO_2 and NOx emissions. Best Available Retrofit Technology modeling has been performed for eligible units.

EKPC entered into two consent decrees in 2007, with the Environmental Protection Agency. The first decree, which concerns units at Spurlock, Cooper, and Dale Units 3 and 4, involves the addition of pollution control devices set to timelines, in addition to system-wide tonnage caps on SOx and NOx emissions. EKPC has the

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[20] Id.

[21] Id., at 8-14.

option to either install and continuously operate NOx and SO_2 emission controls at Cooper Unit 2, or retire and permanently cease operation of Dale Units 3 and 4 by December 31, 2012, or repower Dale Units 3 and 4 by May 31, 2014. EKPC was required to submit in writing by December 31, 2009 its determination of whether it would install new emission controls at Cooper Unit 2, or retire Dale Units 3 and 4.

The second decree is an acid rain issue for Dale Units 1 and 2, which involves the addition of pollution control devices for Dale Units 1 and 2 to meet the acid rain requirements.

EKPC has built and operates two Circulating Fluid Bed ("CFB") units at Spurlock that burn coal in combination with limestone to produce lime (calcium oxide) that reacts with the SO_2 created during combustion to reduce SO_2 emissions. EKPC runs weekly mercury analysis on all plants. EKPC's CFB generators are expected to achieve an overall SO_2 removal rate of over 99 percent. The addition of SCRs and scrubbers on four of EKPC's units serves to remove mercury as a co-benefit.

Spurlock Unit 1 uses cold side Electro-Static Precipitators ("ESP") in combination with Wet ESPs ("WESP") to lower PM. Spurlock Unit 2 uses a hot side ESP in combination with an operating WESP. Both Spurlock CFBs use a fabric filter pulse jet baghouse for PM control. EKPC is operating Spurlock Units 1 and 2 with Selective Catalytic Reduction devices ("SCRs"), which control emissions of nitrogen oxide year round. The Smith 1 CFB unit will also use a fabric filter pulse jet baghouse. An SCR and a baghouse will be added to Cooper Unit 2 in 2012.

EKPC has installed SCRs on Spurlock Units 1 and 2, which substantially reduce NOx emissions, in order to comply with federal emissions regulations.

Intervenor Comments

The Environmental Groups submitted the following comments.

EKPC is a utility that has done, and continues to do, very poor resource planning. EKPC did not seem to consider natural gas-fired combined cycle combustion turbines to meet base load in the 2009 IRP, and continues to build inefficient coal-fired power plants. Historically, EKPC has over-estimated its energy needs. Over-estimation of energy needs results in spending more capital than necessary, causing rates to go up in order to pay for unused or under-utilized power plants. EKPC plans to obtain approximately 83 percent of its electricity from coal-fired generation in 2023. The 2009 IRP fails to provide the required information about planned future supply-side resources. One of the most fundamental problems of EKPC is its using base load generating units to meet its peak demand. The 2009 IRP clearly indicates a lack of serious commitment to meeting its customers' needs with clean, renewable energy from sources like wind and solar. EKPC's 2009 IRP does include a 30 MW Biomass PPA, which would be meeting about 1.5 percent of the total energy requirements in 2023.

Staff agrees that EKPC needs to provide a more detailed analysis of its consideration of the use of renewable energy alternatives in future IRPs. Staff would be interested in reviewing the results of the fuel studies mentioned by EKPC and requests that EKPC file the results of these studies when they become available.

Efficiency Improvements

Generation Efficiency

EKPC stated that it recognizes that maintenance management for existing generation is vital to keeping the generating facilities reliable, productive, efficient, and

cost effective. To that end, EKPC has developed a long-range plan of maintenance needs for each of the existing generating units.

EKPC is using a program called Maintaining Electrical and Generating Equipment Reliability ("MEAGER") for assessing and analyzing the fitness of its generating equipment and facilities in the most cost-effective manner. The MEAGER 2029 Program covers 2009 through 2029.

The MEAGER Program was developed in 1987 and is now updated on a regular basis. To prepare the update this year, the following tasks were completed:

1. Reviewed the original MEAGER 2000 Study;

2. Reviewed the most current annual update prepared by EKPC;

3. Meetings and phone calls were made during the year to discuss future needs for each individual plant;

4. The best-known options were recommended, priced in current-year dollars, and assigned an estimated completion date; and

5. Prepared a final report to be submitted to EKPC's Board of Directors.

Each specific major MEAGER project is again reviewed and justified before requesting approval from the EKPC Board of Directors for implementation of the project. Subsequent to Board approval, technical specifications are prepared and requests for bids are solicited. When received, bids are then evaluated, and a recommendation is made to the Board to proceed with the project. Once approved, a letter is sent to RUS for its approval when required.

Although EKPC provided a list of the MEAGER projects for the 20 year period from 2009 through 2029, no discussion of any projects was provided. [22]

Transmission Improvements

EKPC owns and operates a 2,910-circuit mile network of high voltage transmission lines consisting of 69 kV, 138 kV, 161 kV, and 345 kV lines, and all the related substations. EKPC maintains 63 nominally closed free-flowing interconnections with its neighboring utilities.[23]

The primary purpose of the EKPC transmission system is to reliably transmit electrical energy from its generating sources to its 16-member system. EKPC's transmission system is designed to provide adequate capacity for reliable delivery of generating resources to its member distribution cooperatives, and for long-term transmission service that has been reserved on its system. EKPC is a member of Southeast Electric Reliability Corporation (SERC"), and participates in SERC assessments of transmission system performance for the summer and winter peak load periods. EKPC's transmission planning criteria specifies that the system must be designed to meet projected customer demands for simultaneous forced outages of a transmission facility and a generating unit during peak conditions in summer and winter. As stated above, EKPC is interconnected with neighboring utilities, which improves the reliability of the transmission system and provides potential access to external generation resources for economic and/or emergency purchases to meet projected member system demands.

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[22] Id., Application, Section 8(2)(a), at 8-1 to 8-3.

[23] Id. at 5-1.

EKPC states that it routinely identifies transmission construction projects and upgrades required to maintain the adequacy and capability of its transmission system in order to meet projected demands of its member systems; it also develops a 15-year transmission expansion plan, which includes a combination of new line and substation facilities and upgrades of existing facilities during 2009-2023.

Distribution System

EKPC is responsible for all distribution substation delivery points; it also seasonally monitors peak distribution substation transformer loads in order to identify potential loading issues for its member systems, and jointly develops load forecasts at each distribution point for future loading issues.

EKPC uses a three-year planning time frame for distribution substation planning. EKPC and its member systems identify alternatives that have the lowest implementation costs, unless there are overriding system benefits for a more expensive alternative. EKPC has developed a Transmission Construction Work Plan for 2009-2011 based on detailed engineering analyses and includes transmission and distribution substation projects.

EKPC and its member systems continue to work jointly to install capacitor banks at the distribution system level where power factor correction will provide the greatest benefits to the system and would provide more efficient use of the generation, transmission, and distribution substation system.[24]

[24] Id., at 8-5 to 8-6.

Generation Related Transmission Expansion

EKPC's latest generation expansion plan includes two new CTs at J.K. Smith, which were scheduled for commercial operation in May 2010, and a new steam turbine/generator base load unit at J.K. Smith (CFR Unit #I), scheduled for commercial operation in October 2014.

The transmission expansion requirements for two CT units at J.K. Smith, with a net output of 84 MW summer and 98 MW winter (CTs 9 and 10), are as follows:

Construct approximately 33 miles of 345 kV line from the J.K. Smith Substation to intercept E-ON's Brown North-Pineville 345 kV circuit #2 at a new substation site called West Garrard and construct a new 345 kV switching substation at the West Garrard site. Install 345 kV terminal facilities at J.K. Smith for termination of the new J.K. Smith-West Garrard 345 kV line. All of these projects were scheduled to be completed in May 2010. For the proposed J.K. Smith CFB Unit #1, scheduled for October 2014, minimal transmission expansion is required.

The transmission expansion projects identified for CTs 9 and 10 provide additional capacity to accommodate the expected net output of the CFB unit, estimated to be 278 MW (as well as potential future generation additions at the J.K. Smith site). The initial project required for the CFB unit is to construct a J.K. Smith backup power 69-13.8 kV, 11.2/14 MVA distribution substation, and associated 0.1-mile 69 kV tap line by June 2010, to satisfy construction power requirements and future requirements for plant service. Additional projects include 1) constructing 1.2 miles of 345 kV line between the existing J.K. Smith 345 kV Substation and the J.K. Smith CFB Unit by June 2012 and 2) replacing 138 kV terminal equipment at J.K. Smith, Dale, Fawkes, and

Powell County to increase the limits of the J.K. Smith-Dale, J.K. Smith-Fawkes, and J.K. Smith-Powell County 138 kV lines to the conductor capability by December 2012.

Import Flow Capability

EKPC's load flow analysis studies indicate that the existing import capability from either the TVA system or the PJM system is approximately 1,000 MW. In performing these studies, EKPC attempts to identify external facilities that would limit import capability for EKPC based on the information available in the latest North American Electric Reliability Corporation and the Multiregional Modeling Working Group series of power flow cases.

Discussion of Reasonableness

EKPC has adequately explained the analysis of its generation reserve margin, provided a thorough discussion of the transmission and generation future expansion planning, and considered plans to alleviate emission issues and maintain compliance with the Clean Air Act amendments, the CAIR, and the CAMR.

Recommendations

Based on the discussion of reasonableness, Staff's recommendations are:

1. In the next IRP, EKPC should provide a specific discussion of the existence of any cogeneration within its service territory and the consideration given to cogeneration in its resource plan.

2. EKPC should provide a specific identification and description of the net metering equipment and systems installed on each system. A detailed discussion of the manner in which such resources were considered in the resource plan should also be provided.

3. EKPC should provide a detailed discussion of the consideration given to distributed generation in the resource plan.

4. EKPC should provide a specific discussion of the improvements to, and more efficient utilization of, generation, transmission, and distribution facilities as required by 807 KAR section 8 (2)(a). This information should be provided for the past three years and should address EKPC's plans for the next three years.

5. EKPC should include details of the constraints of its transmission system under extreme summer and winter peak conditions.

6. EKPC's next IRP should include a detailed analysis of actions taken, or actions that may need to be taken, at each generating station, and the projected costs at each station, if more stringent requirements are imposed on the disposal of coal ash.

SECTION 5

INTEGRATION AND PLAN OPTIMIZATION

The Integration Process

EKPC analyzed possible expansion plans using a Net System Costs ("NSC") value produced by RTSim. NSC is comprised of generation costs, power purchase costs, and the value of sales. The RTSim model simulates transmission system operation on an hourly chronological basis to produce costing and emission estimating studies. Variables such as resource options, startup dates, and market and load conditions were used to produce the lowest cost plans. Industry consultants provided detailed cost information and fuel and emissions forecasts. Specific market websites were also used to research trends and other variables. Navigant Consulting provided a review of input assumptions for the market study. The Resource Optimizer incorporates risk analysis, optimization, and production cost simulation to yield the lowest cost/lowest risk plan.

Summary of Results

To account for probable federal air pollution compliance costs, EKPC has imputed a cost of $40 per ton for carbon emissions based on previous legislation proposed under the Bingaman and Lieberman-Warner Bills.

Incorporating the DSM portfolio into the plan yielded a 13% cost savings, compared to the plan without DSM integration.

Specifics of the Supply-Side Analyses

Supply-side alternatives considered in the study included:

1. Combustion Turbines (peaking);

2. Combined Cycles (intermediate);

3. Coal Fired Units (base load);

4. Various Term Purchases; and

5. Renewable Generation.

When taking construction costs into consideration, peaking units provided the lowest cost option. Intermediate and base load capacity units are generally more expensive to construct. However, when considering variable costs, this is not the case. Base load units are typically cheaper to operate with intermediate and peaking units more expensive. The main reason for this has historically been due to fuel costs. Renewable generation, which tends to be more expensive, offers more environmental benefits.

EKPC continues to investigate other supply options in addition to self generation. Partnerships, joint ventures, and long-term power contract opportunities have been covered in ongoing discussions with other utilities and non-utilities.

EKPC has entered into a bulk power purchase agreement with Duke Energy Ohio to purchase the output of the Greenup hydro project (35 MW during winter peak conditions) through the end of 2010.

Specifics of the DSM Analysis

EKPC states that it has considered all major cost-effective DSM options in formulating this IRP. EKPC has placed a value on environmental compliance because the alternative avoidable environmental compliance costs for conventional supply are captured in the avoided costs used to quantify DSM savings. The value of DSM as a resource is combined with its value as a compliance option in determining cost-

effectiveness. DSM does not address all forms of compliance. Best Available Technology requirements cannot be met through reduced load on a unit. However, cap and trade regulatory approaches to emission reduction can be mitigated through DSM measures.

Overall Plan Integration

EKPC and its member systems plan on initiating an aggressive DSM marketing effort to realize the proven benefits of DSM. EKPC plans to continue its residential conservation and load management programs as well as offering more DSM options to its commercial and industrial customers. Non-DSM peaking resource needs will also be evaluated. EKPC also intends to pursue wholesale rate design changes in order to provide appropriate price signals to its distribution cooperatives. Implementation of the plan may be affected by load growth, customer participation in DSM measures, fuel prices, and the cost to emit carbon dioxide.

Staff is generally satisfied with EKPC's IRP and the information contained therein. EKPC's IRP has adequately addressed the Staff recommendations that were included in our prior report on EKPC's prior IRP filing.

EKPC's future IRPs need to include a more comprehensive assessment of alternative resources considered and environmental compliance strategies. Potential revisions and additions to existing environmental compliance regulations require utilities to be more diligent in assessing appropriate and cost effective mitigation strategies. EKPC, as well as all other utilities filing an IRP need to be more proactive in considering these potential environmental regulations and fully addressing them in future IRP filings.