

**THE EMPIRE DISTRICT ELECTRIC COMPANY**  
**VARIANCE REQUEST**

**I. VARIANCE REQUESTS**

**A. 4 CSR 240-22.030 Load Analysis and Forecasting**

**(1). A variance from the below-referenced Missouri Public Service Commission IRP Rules on Load Analysis and Forecasting is being requested.**

**Subject:** End-Use forecasting methodology and load analysis that pertains to end-uses included in the existing Missouri IRP Rule

**Subject IRP Provisions:**

4 CSR 240-22.030 (3)

4 CSR 240-22.030 (3) (A)

4 CSR 240-22.030 (3) (A) 1

(3) Analysis of Use per Unit. For each major class, the utility shall analyze historical use per unit by end use.

(A) End-Use Detail. For each major class, use per unit shall be disaggregated by end use where information permits.

1. Where applicable for each major class, end-use information shall be developed for at least lighting, process equipment, space cooling, space heating, water heating and refrigeration.

4 CSR 240-22.030 (3) (A) 3

4 CSR 240-22.030 (3) (A) 4

4 CSR 240-22.030 (3) (B)

4 CSR 240-22.030 (3) (B) 1

4 CSR 240-22.030 (3) (B) 2

4 CSR 240-22.030 (4) (A)

4 CSR 240-22.030 (4) (B)

If the utility has not yet acquired end use information on space cooling or space heating for a major class, the utility shall determine the effect that weather has on the total load of that major class by disaggregating the load into its cooling, heating and nonweather-sensitive components. If the cooling or heating components are a significant portion of the total load of the major class, then the cooling or heating components of that load shall be designated as end uses for that major class

4. The difference between the total load of a major class and all end uses for which the utility has acquired end-use information shall be designated as an end use for that major class.

(B) The data base and historical analysis required for each end use shall include at least the following:

1. Measures of the stock of energy-using capital goods. For each major class and end use, the utility shall implement a procedure to develop and maintain survey data on the energy-related characteristics of the building, appliance and equipment stock including saturation levels, efficiency levels and sizes where applicable. The utility shall update these surveys before each scheduled filing pursuant to 4 CSR 240-22.080; and

2. Estimates of end-use energy and demand. For each end use, the utility shall estimate end-use monthly energies and demands at time of monthly system peaks and shall calibrate these energies and demands to equal the weather-normalized monthly energies and demands at time of monthly peaks for each major class for the most recently available data.

(4) Analysis of Load Profiles. The utility shall develop a consistent set of daily load profiles for the most recent year for which data is available. For each month, load profiles shall be developed for a peak weekday, are representative of at least one (1) weekday and a representative of at least one (1) weekend day.

(A) Load profiles for each day type shall be developed for each end use, for each major class and for the net system load.

(B) For each day type, the estimated end-use load profiles shall be calibrated to sum to the estimated major class load profiles and the estimated major class load profiles shall be calibrated to sum to the net system load profiles.

#### 4 CSR 240-22.030 (5) (B) 2

2. Use per unit forecast. The utility's forecast of monthly energy usage per unit and seasonal peak demands per unit for each major class shall be based on the analysis described in section (3).

#### 4 CSR 240-22.030 (5) (B) 2 B

#### 4 CSR 240-22.030 (5) (B) 2 C

B. End-use detail. For each major class and for each end use, the utility shall forecast both monthly energy use and demands at time of the summer and winter system peaks.

C. The stock of energy-using capital goods. For each end use for which the utility has developed measures of the stock of energy-using capital goods and where the utility has determined that forecasting the use of electricity associated with these energy-using capital goods is cost-effective and feasible, it shall forecast those measures and document the relationship between the forecasts of the measures to the forecasts of end-use energy and demands at time of the summer and winter system peaks. The values of the driver variables used to generate forecasts of the measures of the stock of energy-using capital goods shall be specified and clearly documented.

#### 4 CSR 240-22.030 (8) (A) 2 B

B. The plots for the forecast period shall show each end-use component of major class energy usage per unit and total class energy usage for the base-case forecast.

#### 4 CSR 240-22.030 (8) (B) 2

2. The plots for the forecast period shall show each end-use component of major class coincident demands per unit and total class coincident demands for the base-case forecast.

#### 4 CSR 240-22.030 (8) (E) 1

1. The plots shall show each end-use component of the hourly load profile.

#### **Justification:**

Empire is requesting a variance from the referenced requirement to perform end-use forecasting and load analysis as part of its upcoming IRP filing. Empire does not have the data or access to the models required to perform the end-use forecasts required in the existing rule, and it is not feasible from a cost or time standpoint for Empire to attempt to change its forecasting approach to the End-Use method contemplated in the Missouri IRP rule. Empire has researched the requirements of developing an end-use forecast. There are a number of reasons why a variance from end-use forecasting should be granted:

- **Software**-It appears that the necessary end-use modeling tools are no longer available. In the past, The Electric Power Research Institute (EPRI) models were widely utilized to aid those utilities that had access to survey results in building appropriate end-use forecasting models. Since utility specific end-use forecasting has not been widely practiced in the electric industry since the late 1990s, EPRI no longer offers its Residential End-Use Energy Planning (REEPS) software.
- **Saturation Surveys**-The customer saturation surveys that are needed to perform end-use forecasting are expensive. The survey itself can range from \$50,000 to \$100,000. In addition to the cost of the survey itself, the required analysis of the survey itself by experienced consultants creates an additional cost of \$30,000 to \$50,000. Including more details in the survey such as home square footage, number of windows and types of insulation can double these cost estimates.
- **Time**-The customer surveys are also labor intensive and time consuming to create, approve, distribute, allow for response time and analyze. Typically the survey results are analyzed by outside consultants. Selecting an outside consultant creates an additional time requirement. The time required to prepare and analyze customer surveys is not available to Empire for the upcoming IRP filing due in September 2007.

**Proposed Alternative for the 2007 IRP Filing:**

Empire proposes to produce class level load forecasts by season with econometric models using regression analysis at the customer class level using customer, weather, energy usage and economic variables. This commonly used method of load forecasting will be used for the upcoming IRP instead of a forecast developed from the sum of energy consumption in end uses such as space heating, air conditioning, etc. that are combined with appliance saturation levels, socio-economic data, and efficiency trend quantifications to reach an “end-use” energy demand. Empire’s forecasting models will be fully explained in the IRP report.

**(2). A variance from the below-referenced IRP Rules concerning the starting points for data retention for use in the forecast of net system loads and system peak demand.**

**Subject:** Starting point of the data base used to forecast net system loads and system peak demand.

**Subject IRP Provisions:**

4 CSR 240-22.030 (1) (D) 1

4 CSR 240-22.030 (1) (D) 2

1. The development of actual and weather-normalized monthly class and system energy usage and actual hourly net system loads shall start from January 1982 or for the period of time used as the basis of the utility's forecast of these loads, whichever is longer.

2. Estimated actual and weather-normalized class and system monthly demands at the time of the system peak and weather-normalized hourly system loads shall start from January 1990 or for the period of time used as the basis of the utility's forecast of these loads, whichever is longer.

**Justification:**

Some of the historical load information by class that is required by the rule is not available. The existing IRP Rule states that the forecasting data base shall have net system loads starting from January 1982 and system peak data from January 1990. Since these dates were written into the rule when the rule was published in the mid-1990s, Empire has interpreted this to be a requirement of approximately ten years of historical data base information.

**Proposed Alternative for the 2007 IRP Filing:**

Empire will use eleven years of historical data in the forecast of both energy and demand in the upcoming IRP. The starting point of this information is the month of January 1996.

**B. 4 CSR 240-22.050 Demand-Side Resource Analysis**

**(1). A variance from the below-referenced IRP Rules concerning estimating the Technical Potential of Demand Side Management is being requested.**

**Subject:** Estimate of technical potential

**Subject IRP Provisions:**

4 CSR 240-22.050 (4)

(4) The utility shall estimate the technical potential of each end-use measure that passes the screening test.

4 CSR 240-22.050 (11) (C)

(C) The technical potential and the results of the utility benefits test for each end-use measure that passes the probable environmental benefits test;

**Justification:**

The technical potential envisioned in the existing IRP rule measures the total energy savings that could possibly be achieved irrespective of economics or barriers to participation. Over the past 10 years, many states and utilities have found technical potential studies to be unnecessary in the development of Demand Side Management (DSM) portfolios. Consultants that performed this type of study in the past are now

recommending that utilities omit this step and move directly to an analysis of the *achievable* potential of DSM. Empire requests a variance from performing the DSM technical potential analysis that is in the current IRP rule for the following reasons:

- **Cost**-The cost to perform an accurate estimate of technical potential is significant. Empire does not have any of the end-use information necessary to run technical potential models. It is estimated that collecting such information would cost in excess of \$100,000.
- **Accuracy**-While end-use information could be “borrowed”, Empire is not aware of any utilities in close proximity to its service territory that have maintained this type of information. Using information from utilities that are not in the same region and do not have similar demographics would severely reduce the accuracy of a technical potential analysis.
- **Timing**-In addition to the high cost, collecting end-use data is time consuming. Empire could not meet its IRP time commitments if such research had to be conducted. Empire would need to develop a request for proposal (RFP), and retain the services of a contractor. The contractor would have to collect Empire specific end-use information and then conduct the technical potential study. A three to six month timeframe is a reasonable estimate to perform such a technical potential study.
- **Scope**-Utilities the size of Empire do not generally conduct technical potential studies independently. Given the cost and scope of these studies, smaller utilities generally pool their resources and participate in statewide studies.
- **Existing DSM Programs**-In 2006, Empire developed a comprehensive DSM portfolio with participation goals and estimates for energy and demand savings that were approved by the Customer Programs Collaborative (CPC<sup>1</sup>) that arose as part of the Stipulation and Agreement reached as part of Empire’s approved Regulatory Plan.

#### **Proposed Alternative for the 2007 IRP Filing:**

- Use the existing portfolio of DSM programs that was evaluated for the Customer Programs Collaborative (CPC<sup>1</sup>) as a baseline representing achievable potential under a set of assumptions developed through the Empire CPC.
- Update all assumptions including new avoided costs and retail rate forecasts.
- Add in demand response programs for all classes of customers to reflect increases in avoided costs and retail rates provided by Global Energy Decisions (GED) from the MIDAS Gold modeling.
- Reanalyze all DSM programs and end uses (where applicable) under the new set of baseline assumptions generating new benefit cost (BC) results.
- Develop new achievable potential estimates for all DSM programs under two different (higher) avoided cost and retail rate scenarios (medium and high environmental cost cases).
- For each DSM program and end use (where applicable) modify participation rates, energy and demand savings, measure costs and program costs to reflect the higher avoided costs and retail rates. This analysis is done for both the medium

and the high environmental cost cases. Increases in energy and demand savings are not linear as increased participation will sometime result in diminishing returns. Not all programs were modified under the different scenarios. Each program underwent its own achievable potential analysis.

- Re-estimate BC results for all programs under the medium and high cases.
- Provide energy and demand savings at the program level by month by year (for all 20 years of the planning horizon) for all three scenarios (base, medium and high environmental cost cases) for inputs into MIDAS Gold models.
- Evaluate the potential DSM programs on an equal basis as supply side resources in the MIDAS Gold model.

<sup>1</sup>The CPC is a collaborative body consisting of Empire and interested non-IOU Signatory Parties to the Stipulation in case EO-2005-0263 that makes decisions pertaining to the development, implementation, monitoring and evaluation of Empire's Affordability, Energy Efficiency and Demand Response Programs.

## **(2). A variance from the below-referenced IRP Rules concerning Market Research Studies is being requested.**

**Subject:** Market research studies

### **Subject IRP Provisions:**

4 CSR 240-22.050 (5)

(5) The utility shall conduct market research studies, customer surveys, pilot demand-side programs, test marketing programs and other activities as necessary to estimate the technical potential of end-use measures and to develop the information necessary to design and implement cost-effective demand-side programs. These research activities shall be designed to provide a solid foundation of information about how and by whom energy related decisions are made and about the most appropriate and cost-effective methods of influencing these decisions in favor of greater long-run energy efficiency.

4 CSR 240-22.050 (11) (E)

(C) The technical potential and the results of the utility benefits test for each end-use measure that passes the probable environmental benefits test;

### **Justification:**

Conducting market research is important to develop the information necessary to design and implement cost-effective demand-side programs, and Empire will perform market research in the future. However, in regards to this IRP and the timeframe to complete the IRP, the market research supports the estimates of the technical potential associated with DSM programs, and is unneeded for this IRP given the technical potential variance Empire has requested and the timeframe in which Empire is required to file its IRP.

### **Proposed Alternative for the 2007 IRP Filing:**

Empire believes that some level of market research for its specific service territory is important, and plans to conduct a limited level of market research in the future. In addition, Empire has participated with other Missouri electric utilities in the Missouri

Residential Market Assessment Study conducted by RLW Analytics in 2006. Due to Empire's size compared to that of the other participating companies, Empire had only 19 customers in this survey. For this IRP filing, Empire will use experience gained throughout the electric industry on program design to analyze the potential for DSM without the need to conduct the time consuming and expensive primary research envisioned in the current IRP rule.

**(3). A variance from the below-referenced IRP Rules concerning the Screening of End-use Measures is being requested.**

**Subject:** Cost-effectiveness screening of end-use measures

**Subject IRP Provisions:**

- 4 CSR 240-22.050 (3)
- 4 CSR 240-22.050 (3) (A)
- 4 CSR 240-22.050 (3) (B)
- 4 CSR 240-22.050 (3) (B) 1
- 4 CSR 240-22.050 (3) (B) 2
- 4 CSR 240-22.050 (3) (C)
- 4 CSR 240-22.050 (3) (C) 1
- 4 CSR 240-22.050 (3) (C) 2
- 4 CSR 240-22.050 (3) (C) 3
- 4 CSR 240-22.050 (3) (D)
- 4 CSR 240-22.050 (3) (E)
- 4 CSR 240-22.050 (3) (F)
- 4 CSR 240-22.050 (3) (G)

(3) Cost-Effectiveness Screening of End-Use Measures. The utility shall evaluate the cost effectiveness of each end-use measure identified pursuant to section (1) using the probable environmental benefits test. All costs and benefits shall be expressed in nominal dollars.

(A) The utility shall develop estimates of the end-use measure demand reduction for each demand period and energy savings per installation for each avoided cost period on a normal-weather basis. If the utility can show that subannual load impact estimates are not required to capture the potential benefits of an end-use measure, annual estimates of demand and energy savings may be used for cost-effectiveness screening.

(B) Benefits per installation of each end-use measure in each avoided cost period shall be calculated as the demand reduction multiplied by the levelized avoided demand cost plus the energy savings multiplied by the levelized avoided energy cost

1. Avoided costs in each avoided cost period shall be levelized over the planning horizon using the utility discount rate.

2. Annualized benefits shall be calculated as the sum of the levelized benefits over all avoided cost periods.

(C) Annualized costs per installation for each end-use measure shall be calculated as the sum of the following components:

1. Incremental costs of implementing the measure (regardless of who pays these costs) levelized over the life of the measure using the utility discount rate;

2. Incremental annual operation and maintenance costs (regardless of who pays these costs) levelized over the life of the measure using the utility discount rate; and

3. Any probable environmental impact mitigation costs due to implementation of the end-use measure that are borne by either the utility or the customer.

(D) Annualized costs for end-use measures shall not include either utility marketing and delivery costs for demand-side programs or lost revenues due to measure-induced reductions in energy sales or billing demands between rate cases.

(E) Annualized benefits minus annualized costs per installation must be positive or the ratio of annualized benefits to annualized costs must be greater than one (1) for an end use measure to pass the screening test. The utility may relax this criterion for measures that are judged to have potential benefits which are not captured by the estimated load impacts or avoided costs.

(F) End-use measures that pass the probable environmental benefits test must be included in at least one (1) potential demand side program.

(G) For each end-use measure that passes the probable environmental benefits test, the utility also shall perform the utility benefits test for informational purposes. This calculation shall include the cost components identified in paragraphs (3) (C) 1. and 2.

4 CSR 240-22.050 (11) (A)

4 CSR 240-22.050 (11) (B)

(A) A list of the end-use measures developed for initial screening pursuant to the requirements of section (1) of this rule;

(B) The estimated load impacts, annualized costs per installation and the results of the probable environmental benefits test for each end-use measure identified pursuant to section (1);

**Justification:**

Empire is requesting a variance from the referenced requirements to perform end-use forecasting and load analysis. The specific rules related to the Screening of End-use Measures listed above are related to this earlier variance request. The potential DSM candidates that Empire has developed reviewed all end uses for all classes of service. The specific programs were based upon industry best practices. By reviewing and incorporating industry best practices into the program designs and specific end use measures, cost effective screening at the end use level has already been performed.

**Proposed Alternative for the 2007 IRP Filing:**

Program cost effectiveness screening can be performed with the requirements in paragraph (6) of Commission Rule 4 CSR 240-22.050. The potential DSM candidates that Empire has developed reviewed all end uses for all classes of service. The specific programs were based upon industry best practices. By reviewing and incorporating industry best practices into the program designs and specific end use measures, cost effective screening at the end use level has already been performed.

**II. OTHER CLARIFICATIONS**

**(1). The below-referenced IRP Rules discuss forecasting and subclasses.**

**Subject:** Forecasting with subclasses.

**Subject IRP Provisions:**

4 CSR 240-22.030 (1) (A) 1



#### 4 CSR 240-22.030 (1) (A) 2

1. Taking into account the requirement for an unbiased forecast as well as the cost of developing data at the subclass level, the utility shall determine what level of subclass detail is required for forecasting and what methods to use in gathering subclass information for each major class.
2. The utility shall consider the following categories of subclasses: for residential dwelling type; for commercial, building or business type; and for industrial, product type. If the utility uses subclasses which do not fit into these categories, it must explain the reasons for its choice of subclasses;

#### 4 CSR 240-22.030 (2) (C)

(C) Where the utility has modeled the relationship between the number of units and the driver variables for a major class, but not for subclasses within that major class, it shall consider how a change in the subclass shares of major class units could affect the major class forecast.

#### **Notes:**

The existing IRP Rule states that the utility shall *consider* the use of subclasses when forecasting, but does not appear to require the utility to use subclasses. As such, Empire feels that a specific variance from the existing IRP Rule is not required. Empire is forecasting at the rate class level, but wants to make it clear that other subclasses will not be used as part of its upcoming IRP filing since Empire has not maintained other subclass data.

#### **(2). The below-referenced IRP Rules discuss transmission and distribution system planning.**

**Subject:** Transmission and Distribution Planning

#### **Subject IRP Provisions:**

#### 4 CSR 240-22.040 (3)

(3) The analysis of supply-side resource options shall include a thorough analysis of existing and planned interconnected generation resources. The analysis can be performed by the individual utility or in the context of a joint planning study with other area utilities. The purpose of this analysis shall be to ensure that the transmission network is capable of reliably supporting the supply resource options under consideration, that the costs of transmission system investments associated with supply-side resources are properly considered and to provide an adequate foundation of basic information for decisions about the following types of supply side resource alternatives:

#### 4 CSR 240-22.040 (6)

#### 4 CSR 240-22.040 (7)

(6) For the utility's preferred resource plan selected pursuant to 4 CSR 240-22.070(7) the utility shall determine if additional future transmission facilities will be required to remedy any new generation-related transmission system inadequacies over the planning horizon. If any such facilities are determined to be required and, in the judgment of utility decision-makers, there is a risk of significant delays or cost increases due to problems in

the siting or permitting of any required transmission facilities, this risk shall be analyzed pursuant to the requirements of 4 CSR 240-22.070(2).

(7) The utility shall assess the age, condition and efficiency level of existing transmission and distribution facilities, and shall analyze the feasibility and cost-effectiveness of transmission and distribution system loss-reduction measures as a supply-side resource. This provision shall not be construed to require a detailed line-by-line analysis of the transmission and distribution system, but is intended to require the utility to identify and analyze opportunities for efficiency improvements in a manner that is consistent with the analysis of other supply-side resource options.

**Notes:**

The existing IRP Rule predates the current Southwest Power Pool, Inc regional transmission organization's (SPP RTO) transmission planning process and does not contemplate such an organization. SPP conducts three studies directly associated with transmission planning: Large Generation Interconnection Studies, Aggregate Transmission Service Studies, and the SPP Transmission Expansion Plan. Empire actively participates, as a customer and transmission owner, in the development and implementation of all of the transmission studies conducted by SPP. In addition, Empire is continually monitoring the distribution system and looking for cost effective ways to maintain and improve the distribution system.

**Proposed Alternative for the 2007 IRP Filing:**

Empire will provide a section outlining the SPP transmission planning processes and the extent of Empire's participation in these processes in its upcoming IRP filing. The distribution system maintenance and improvements that are under consideration will also be described in the IRP report.